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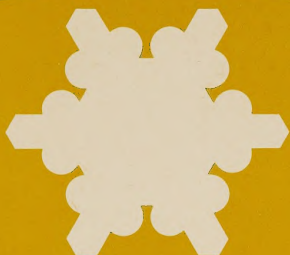
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1972 Government Activities in the North

Advisory Committee on
Northern Development

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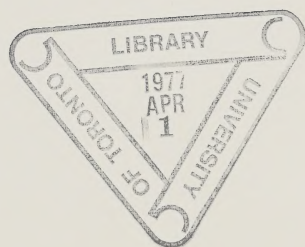
1972 Government Activities in the North

1972 Report and 1973 plans

Advisory Committee
on Northern Development

This report is also available
in French
Cette publication existe aussi
en version française

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FOREWORD

Much of the material used under the headings 'Plans for 1973' had to be assembled in 1972. By the time this document is published, many of these plans will be 'fait accompli'; others may have been severely modified or abandoned. It is not practicable to constantly review the status of these plans as publication of the book proceeds; consequently, they are treated throughout as being in the future.

**MEMORANDUM FOR THE
ADVISORY COMMITTEE ON
NORTHERN DEVELOPMENT**

Document ND 519

**Government Activities in the North-1972
and plans for 1973**

On January 22, 1953, the Cabinet directed that the Advisory Committee on Northern Development report immediately and periodically thereafter on all phases of development in the Canadian north. The Committee agreed the report should be brought up to date on an annual basis.

This report covers the activities of all federal departments and agencies operating in both Territories for the year 1972 and outlines their plans for 1973.

Due to the co-operation of its many contributors, the report has increased in popularity and is widely used as a work of reference.

It is unclassified and copies can be obtained in either French or English by writing to the Information Services, Department of Indian Affairs and Northern Development, Ottawa, Ontario K1A 0H4.

Advisory Committee on
Northern Development
Centennial Tower
400 Laurier Avenue West
Ottawa, Ontario K1A 0H4
Canada

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VISORY COMMITTEE ON NORTHERN DEVELOPMENT (ACND)

Responsibilities

to advise the government on policy relating to civilian and military undertakings in northern Canada and to provide for the effective co-ordination of all government activities in that region.

Review of 1972 Operations

The ACND under the chairmanship of H.B. Robinson, deputy minister of IND, established three sub-committees during the year:

Interdepartmental Co-ordinating Sub-committee — Yellowknife
Chairman — Commissioner, NWT
Sub-Committee on the Employment of Native Northerners
Chairman — S.W. Hancock of the Government of the NWT
Working Group — Mackenzie Valley Highway Project
Environmental Committee of the Mackenzie Highway
Chairman — A.T. Davidson, Department of the Environment
In accordance with the policy for the period 1971 to 1981, a working group to study the financial implications of northern development policy was developing procedures to determine total government expenditures on development in the North.
The following sub-committees and related working groups were active in 1972:

Co-ordinating Committee

Chairman — Mr. A.D. Hunt, Assistant Deputy Minister, DIAND
Working Group
Arctic Waters Pollution Prevention Regulations
Archaeological Salvage
Post-Operational Phase Dewline
Project to study sea ice phenomena in relation to arctic navigation

Transportation Sub-Committee

Chairman — Mr. M. Hagglund, Ministry of Transport
Steering Group — Marine Transport
Working Group — POL Purchasing Procedures
Working Group — Mackenzie Valley Transport
Working Group — Aesthetic Pollution in the Arctic

Sub-Committee on Science and Technology

Chairman — Dr. J.M. Harrison, E.M.R. (15 Jan. 1973 replaced by Dr. J.D. Keys NRC)
Executive Group
Working Group — Grants to Extra Government Agencies
— National Representation to the Vth International Congress: "Arctic Oil & Gas — Problems & Possibilities" Le Havre — France
— Standing Committee on Research Projects
— International Polar Organizations
— Data Evaluation for proposal on Air-supported Structures for the Arctic
— Scientific Guidelines

A seminar on Guidelines for Scientific Activities in Northern Canada was held at Mont Gabriel, P.Q. October 15 to 18, 1972 with participants from government, industry and the academic community. The results of the seminar have been published under the title *Science and the North* and can be obtained from Information Canada Cat. #72-7772.

Working Group — Canada/USSR Scientific Agreement

Dr. Harrison led an eleven man scientific delegation to the USSR in February 1972 and agreement was reached on the initial steps which could be taken through co-operation in scientific studies. In November 1972 a reciprocal visit to Ottawa by a Russian delegation, headed by Dr. E.I. Sklyarov,

took place during which discussions were initiated on Arctic science, research and development leading to joint participation in programs.

Sub-Committee on Northern Communications

Chairman — Mr. D.S. Loftus, DOC (1 Jan. 73 replaced by Mr. de Montigny Marchand, Assistant Deputy Minister of DOC)
Working Group — Community Broadcasting

Interdepartmental Co-ordinating Committee — Whitehorse

Chairman — Commissioner, Yukon Territory

CANADA DEPARTMENT OF LABOUR (LAB)

Responsibilities

Conciliation and other services necessary to effective industrial relations; administration of employment standards; fair employment practices, equal pay for women, and employee safety legislation; compensation to Public Service employees for occupational injury or illness; surveys of wage rates, hours of labour, and other working conditions.

Long-term Plans

Normal planning to meet responsibilities.

Review of 1972 Operations**INDUSTRIAL RELATIONS****Conciliation and Arbitration Branch**

The branch participates in labour relations in the Northwest Territories and the Yukon in connection with proceedings under Part V (Industrial Relations) of the Canada Labour Code.

This covers:

- (1) Preliminary investigation of applications made to the Canada Labour Relations Board by a union seeking to represent a unit or units of employees.
- (2) Disputes arising from the interpretation, application or violation of provisions of a collective agreement whereby the minister is asked to appoint an arbitrator or arbitration board chairman.
- (3) Disputes regarding unfair labour practices.
- (4) Disputes over the renewal or revision of a collective agreement.

During the calendar year 1971, the following activities were carried out by the Conciliation and Arbitration Branch in respect to 1, 2, 3 and 4 above:

- (1) 13
- (2) 2
- (3) Nil

- (4) (a) Conciliation officers appointed — 22
- (b) Conciliation boards established — 2

Labour-Management Consultation Branch

This branch is responsible for developing union-management relations through the use of labour-management consultation committees.

No long-term plans have been formulated beyond the support and servicing of initiatives which were begun in 1972, and those planned for 1973.

On 20 July 1972 Mr. E.M.R. Cotterill, secretary to the executive, Government of the Northwest Territories, and Mr. Wayne Peterson, executive secretary-treasurer, Northwest Territories Public Service Association, forwarded a joint request for the services of the Labour-Management Consultation Branch, to the former Minister of Labour, The Honourable Martin O'Connell. Pursuant to this request in September 1972 the branch director, accompanied by a field representative from the branch's Edmonton office, met with the two parties in Yellowknife. As a result of these meetings, the branch's Edmonton representative acted on these matters and established regional committees at Frobisher Bay, Fort Smith, Inuvik, Yellowknife and Churchill, Manitoba. A headquarters committee was also established in Yellowknife to deal with problems of the Territories as a whole.

In 1973 the Edmonton field representative plans to establish, where feasible, sub-committees reporting directly to the regional committees that he established in 1972. Possible sites for committees at this level are Cambridge Bay and Hay River. For the purpose of tendering advice and making suggestions on meeting content and procedure, he will be attending meetings of those committees that he has already established.

In 1973 the Edmonton representative also plans to extend consultation to several of the mines located in the Territories, and make exploratory presentations in numerous others.

Employee Representation Branch

The branch is concerned with matters of labour relations in the Northwest Territory and the Yukon Territory involved in proceedings under Part V (Industrial Relations) of the Canada Labour Code.

The Canada Labour Relations Board, of which the branch forms the administrative arm, performs the following:

- processes applications for certification as bargaining agent;
- processes applications for revocation of certification;
- provides a procedure for the final settlement of differences about the meaning or violation of a collective agreement;
- on referral by the minister of labour, considers allegations of failure to bargain in good faith;
- deals with application for the review and reconsideration of decisions made by the board in the preceding four items.

During 1972 the board received 15 applications from trade unions for certification as bargaining agents of units of employees north of 60. In addition, two cases, pending at the end of 1971, were dealt with by the board in 1972. There were 17 applications for certification, 12 affecting employees in the Yukon and five in the Northwest Territories.

In the two Territorial areas the board granted 13 applications for certification, two were withdrawn and two were still pending on 31 December 1972.

The board also received one application for revocation and three requests for review affecting employees in the Yukon Territory, of which were granted by the board during the year.

There are no plans to expand the activities of the branch in the North. These activities are governed entirely by the number of applications submitted to the Canada Labour Relations Board.

Fair Employment Practices Branch

The Fair Employment Practices Branch of the Canada Department of Labour is responsible for investigating complaints of discrimination on grounds of race, colour, religion or national origin in areas under federal jurisdiction, and for promoting equal employment opportunity for disadvantaged minority groups.

During 1972-73, however, there were no complaints in either the Yukon Territory or the Northwest Territories.

During 1973-74 the branch will be working with the Special Staff group on Employment and Economic Development and others in the Department of Indian Affairs and Northern Development to plan initiatives to increase employment opportunities for native peoples in the North.

EMPLOYMENT STANDARDS

Labour Standards Branch

Federal Contracts Division

Inspections on government contracts: During 1972 sixteen inspections were made by branch officers. Of these, 11 were made in the Northwest Territories and five in the Yukon Territory. These inspections directly affected 11 main contractors and five sub-contractors. Wage adjustments involving \$1,939.59 were collected from three main contractors and four sub-contractors.

Wage schedules issued:

	NWT	YT
Construction contracts	65	35
Service contracts	Nil	Nil

Standards Division

It should be noted that the provisions of Part III of the Canada Labour Code (Labour Standards) do not apply to a local or private firm, undertaking or business in the Yukon Territory or the Northwest Territories. The municipal councils have issued ordinances on employment standards in activities that fall

within their jurisdiction; however, Part III of the code does apply to those kinds of business that normally come within federal jurisdiction when located in the provinces.

During 1972, a total of seven complaints were investigated under Part III of the Canada Labour Code (Labour Standards) of which four were in the Northwest Territories and three in the Yukon. As a result of these investigations, \$1,375.00 was recovered for 14 employees.

In the same period there were three routine inspections carried out under the same authority, all of which were in the Northwest Territories. Two of these were found to be in compliance with the code and the other was an owner-operator enterprise that was not subject to the code.

In the Yukon and Northwest Territories, responsibility for enforcement of the legislation has been assigned to the Labour Standards Branch regional offices in Winnipeg, Edmonton and Vancouver, as follows:

Territory	Responsible regional office
Northwest Territories (east of 102° longitude)	Winnipeg, Manitoba
Northwest Territories (west of 102° longitude)	Edmonton, Alberta
Yukon Territory	Vancouver, B.C.

Plans for 1973 will be similar to those of 1970 1971 1972 and the anticipated results of activities will vary only slightly from those of the past three years.

Accident Prevention and Compensation Branch

The branch has a long-standing responsibility to administer the Government Employees Compensation Act. During 1972 it made considerable progress towards carrying out a comprehensive employee safety plan which will cover employees subject to Part IV of the Canada Labour Code, and those employed in public service premises under the authority of the Occupational Safety Policy of the Public Service of Canada.

Accident Prevention Division

Surveys

All major federal enterprises and the public service departments in the Yukon Territory and Northwest Territories were visited during 1972 by regional safety personnel, who conducted safety audits, investigated accidents and promoted accident prevention.

Preliminary discussions were held to incorporate electrical inspection service in the

Safety Inspection Services Agreement negotiated in 1971 with the government of the Northwest Territories for the regular inspection of boilers and pressure vessels. The service for the inspection of boilers and pressure vessels became fully operative by the end of 1972. Negotiations were continued with the government of the Yukon Territory for a similar agreement for the inspection of boilers and pressure vessels in federal establishments in the Yukon.

As part of regular safety audits, visits were made to the principal locations of the Department of Public Works marine operations and the Atmospheric Environment Service of the Department of the Environment. A safety audit conducted to assess the operations of the Northern Canada Power Commission involved travelling 19,000 air miles and visits to 31 settlements.

Follow-up on the 1971 Northern Transportation Company Limited safety audit revealed an improved standard of employment safety in that company.

Routine visits were made to approximately 100 public service departments and federal enterprises in almost forty locations throughout the Territories, to establish contacts and assess employment safety standards. In addition, safety inspections were made by employees of the Department of Public Services of the Government of the Northwest Territories, acting as federal safety officers, for 246 of 364 boilers and pressure vessels owned by federal government departments and federal enterprises.

Safety Training

First-aid training, initiated by this department in 1970 for personnel in the Yukon and Northwest Territories, became sufficiently established that the St. John Ambulance arranged for a permanent command post to be set up in 1972. To ensure that requirements of the First Aid Regulations and Treasury Board Standards for training and supplies are maintained, liaison between the department and the St. John Ambulance has been established.

Arising from a regional safety office assessment of the unsatisfactory accident record of the Mackenzie Forest Service fire fighting operations during 1971, the Department of Indian Affairs and Northern Development instituted measures which substantially reduced the frequency and costs of accidents during the 1972 fire season. Further procedural improvements are under way which can be expected to substantially reduce accidents and loss of forest resources.

Typical of the wide scope of safety considerations resolved within a single organization is the improvement in substandard living conditions in boarding cars and the handling of explosives at a railway yard of the Great Slave Lake Branch of the CNR.

A pilot project, initiated in 1971 at Frobisher Bay, NWT, to stimulate local safety program development and regular monitoring of safety activities in all public service and federal enterprises at that location, was discontinued due to lack of interest by the Frobisher Bay organizations involved.

Supervisory training was provided on the techniques of accident investigation to personnel of the departments of Transport, Environment, and Public Works, the Whitepass and Yukon Railway and the Northern Canada Power Commission. The Department of Labour film "The Unplanned" was used as a visual aid.

Plans for 1973

Current programs will be followed up with the organizations concerned and the smaller, more remote locations not already visited will be systematically included over a period of years. Routine visits of the larger work locations will be made approximately once a year and less frequently elsewhere, at intervals dependent on the type of work (hazards, etc.), number of employees and remoteness (access to the location). As in the other regions, activities will be directed towards developing accident prevention procedures which relate directly to the deficiencies found through safety audits, routine examination of work places, etc. During 1973 programs to remedy a deficiency found to be common to most organizations in the Territories will emphasize training and supervisory involvement in accident investigation.

Negotiations already initiated with the territorial government will continue in order to formulate a boiler and pressure vessel inspection agreement in the Yukon and an electrical inspection agreement in the Northwest Territories.

Accident Compensation Division

Claims of federal government employees, usually employed in the Yukon Territory and the Northwest Territories, for compensation for occupational accidents or diseases were received in the branch and forwarded to the Workmen's Compensation Board of Alberta for adjudication and payment under a federal-provincial arrangement. A total of 353 claims were received and disbursements were \$131,156.

RESEARCH AND DEVELOPMENT

Economics and Research Branch

The Economics and Research Branch conducts two annual surveys of employers in Canada, one on wage rates, salaries and standard hours of labour; the other on working conditions. The surveys included 47 establishments in the Yukon Territory, of which 12 are under federal jurisdiction, and 75 in the Northwest Territories of which 19 are under federal jurisdiction. These two regions were also included in a special study on the distribution of employees by wage and salary rates in industries under federal jurisdiction — Part III (Labour Standards) of the Canada Labour Code. The branch also maintains a file of collective agreements covering employees in these areas.

CANADIAN BROADCASTING CORPORATION (CBC)

NORTHERN SERVICE RADIO STATIONS

FB FROBISHER BAY, N.W.T.* (1210 kHz/250 W)	CHFC FORT CHURCHILL, Manitoba (1230 kHz/250 W)
CHAK INUVIK, N.W.T. (860 kHz/1000 W)	
CFWH Whitehorse, Y.T. (1700 kHz/1000 W)	CFYK YELLOWKNIFE, N.W.T. (1340 kHz/1000 W)

to CBC Network connection; news received via shortwave, network programs on tape recordings.

NORTHERN SERVICE LOW-POWER RELAY TRANSMITTER STATIONS

(**Unattended radio stations broadcasting from the network)

CFWH is the program centre
for the Yukon LPRT** Network:

ermacks (990 kHz/40 W)
ayo (1230 kHz/40 W)
sa (560 kHz/40 W)
awson City (560 kHz/40 W)
nton Creek (990 kHz/40 W)
slin (940 kHz/40 W)
ift River (970 kHz/40 W)
tson Lake (990 kHz/40 W)
ssiar (1340 kHz/40 W)
ines Junction (860 kHz/40 W)
struction Bay 940 kHz/40 W)
aver Creek (690 kHz/40 W)
ro (1230 kHz/40 W)

Pacific Network

rt Nelson (1240 kHz/40 W)

CFYK is the program centre for
the Mackenzie LPRT** Network:

Hay River (1490 kHz/40 W)
Pine Point (880 kHz/40 W)
Fort Smith (860 kHz/40 W)
Uranium City (880 kHz/40 W)
Fort Chipewyan (1450 kHz/40 W)
Fort Providence (1230 kHz/40 W)
Fort Simpson (690 kHz/40 W)
Norman Wells (990 kHz/40 W)
Fort Good Hope (920 kHz/40 W)
Fort Resolution (1150 kHz/40 W)
Wrigley (1280 kHz/40 W)
Fort Norman (920 kHz/40 W)
Rae/Edzo (1440 kHz/40 W)

Affiliated Station

Tuktoyaktuk (600 kHz/1000 W)

NORTHERN SERVICE FRONTIER TELEVISION STATIONS (1972)

HITEHORSE - CFWH - TV
ATSON LAKE - CBTE - TV - 1
SSIAR - CBTD - TV
RT NELSON - CBTD - TV - 1
INTON CREEK - CBTE - TV - 2
AWSON CITY - CBTE - TV - 3
SA - CBTE - TV - 5

FARO - CBTE - TV - 6
YELLOWKNIFE - CFYK - TV
URANIUM CITY - CBTA - TV - 1
INUVIK - CHAK - TV
PINE POINT - CBTE - TV
FORT SMITH - CBTE - TV - 4
FROBISHER BAY - CFFB - TV

NORTHERN SERVICE

Responsibilities

To provide a broadcasting service to meet the special needs of the people living in the North — native Indian, Eskimo and Métis, and non-natives — and give them a sense of identity with the rest of Canada; and to inform the latter about the people of the North and developments there. The Northern Service discharges these responsibilities by means of medium-wave and short-wave radio and, to an increasing extent, television.

Long-term Plans

To continue to extend radio and television service to those communities as yet unserved, and to improve the quality of programs, particularly for the native Indian, Eskimo and Métis peoples, by involving them more closely in planning and production. This will be done in co-operation with government departments and agencies, particularly the Departments of Education and the National Film Board.

It is hoped to develop the talents of the people in public affairs and in the creation of entertainment and educational programs. Film animation is one of the obvious areas for which the native peoples of the North have potential talent.

The launching of Canada's domestic telecommunications satellite ANIK ("little Brother"), in November 1972, and its operational use early in 1973 will make it possible for CBC to extend its radio service to hitherto unreachable communities, and to provide network television service, "live" and in colour, to every community equipped to receive it.

The television signal is received from the satellite on saucer-shaped earth stations (TRO, Television Receive Only) and delivered by microwave to the nearest CBC television transmitter. This innovation will enable the Northern Service, early in 1973, to convert its FCP ("Frontier-Coverage Package") TV stations, which broadcast four hours daily of delayed videotaped programs, to immediate rebroadcast of a full day's national network program schedule of about 14-1/2 hours.

During the seven-year life of ANIK I, some 35 remote or isolated northern communities, including those 14 FCP stations now operating in the North, will receive television programs via satellite from the South. More stations will be established if and when the CBC's Accelerated Coverage Plan to

provide TV service in both official languages to all Canadian communities with a population of 500 and over, is accepted and funded by the federal government.

The Accelerated Coverage Plan also provides for the extension of radio service to communities of a similar size. A plan to provide a radio service to northern communities of 200 or more, is being prepared jointly by CBC, the Canadian Radio-Television Commission, and the departments of Communications, and Indian Affairs and Northern Development. This service will meet the local and regional as well as the national program needs of the people.

The Northern Service shortwave antenna array will, after many delays, probably be completed at Sackville, N.B., in 1973. Tests with one of the new 250 KW transmitters will be carried out on the new MHZ array during January 1973. It is hoped the 6, 11 and 15 MHZ arrays will be completed by late summer and plans to extend the service to 18-1/2 hours a day, approved.

Review of 1972 Operations

The main technical activity in the North during the Summer of 1972 was the installation of backhaul facilities for the interconnection of the FCP television transmitters with Telesat Canada's television receive stations. The only FCP station which will continue the four-hour television service a little longer than the others, is Elsa, YT, which, together with a new station at Mayo, YT, will be served by the receive station planned for Keno, YT in late 1973.

In the lower Mackenzie Valley and Delta the creation of an area network of LPRTs linked to the program centre at Inuvik had to be deferred until 1974.

To speed the interchange of program material among northern stations and the South broadband facilities were installed at Inuvik, Yellowknife and Whitehorse.

Programs

A short 15 years ago, when the Northern Service was formed, CBC's voice in the North consisted of *Northern Messenger*, a program of personal messages which is still broadcast, and disc-recordings of network shows on local community stations, most of which were operated by the Armed Forces.

Step by step, CBC has played its part in the development of the North, first in radio and then in television. Its Yukon and Mackenzie radio networks with program centres

at Whitehorse, YT, and Yellowknife, NW, its other program centres at Churchill, Manitoba and at Inuvik and Frobisher Bay in the Northwest Territories, together with its shortwave service programmed from Montreal, Quebec, to the more isolated settlements of the northern region, act as a bond between northerners, and serve to unite them with the rest of the country. It is activities that make the local news and provide material for national broadcast. It is concerns that are discussed locally and receive national attention. It is their talent to entertain themselves that is shared by the nation. And, it is their broadcasts in Indian and Eskimo, as well as in English and French, that attest to the multicultural character of Canada. This is happening in radio: it lies ahead in television.

Using broadcasting as a means for community expression, CBC has co-operated with various groups experimenting in the North.

Beginning in November, programs involving the Indian and non-Indian communities at La Ronge, Saskatchewan, were videotaped locally by two community workers and telecast on CBC's FCP station. At Rankin Inlet, NWT, the "Comminterphoto" project, developed in co-operation with Bell-Northern Research and the Department of Communications, enabled the Eskimo non-Eskimo community to make local broadcasts by telephone from the home. outcome of this experiment was CBC's undertaking to establish a community-operated radio station at Rankin Inlet.

In the Yukon and Northwest Territories CBC continued its co-operation with native organizations by broadcasting a range of programs prepared by them. At Whitehorse the *Dun Quandro* series was prepared with the help of the Yukon Native Brotherhood at Inuvik the *Native Voice* series in Loucheux, Hareskin, and Eskimo was undertaken in co-operation with the Committee for the Original Peoples' Entitlement (COPE); and at Yellowknife, *The Voice of Northern Alberta*, a weekly program in the Cree language, was produced by the Alberta Native Communications Society, and contains traditional Indian music, news centering around Fort Chipewyan and general information concerning native people, nationally and regionally.

At Whitehorse, a drama series about pioneer days, a series of school debates by Yukon students, and a major documentary series on the land claims of the Yukon Indian were typical of radio productions

Northern Service. At Inuvik, the *Lillian Nitroff Show* quickly made its mark as a public affairs program specializing in summer information. At Churchill, despite the fire which gutted its studios in October, the station continued without missing a broadcast, with its daily programs in Cree, Chipewyan and Eskimo, and its weekly news in English, *Native North*. Yellowknife, which broadcasts in as many as seven languages, provided a wide range of community programming including its own *Native Voice* news in Slavey, Dogrib and Chipewyan, and Territorial news service. Frobisher Bay completely overhauled its program service to open community participation in Eskimo, French and English programs, and increased Eskimo-speaking staff. At Montreal shortwave programming in Eskimo was increased with the new program *Tarqramuit*, summarizing editorial comment from newspapers published in both the North and the South. A twice-daily program in Cree began in the James Bay area of northern Quebec. Additional program respondents were recruited at community level by the Northern Shortwave Service; production continued of *Ookpik*, a popular drama series in English for children; *Winds of Change* began on a documentary series dealing with the 100-year history of the RCMP, and operation continued with Loyola University in the production of *Winds of Change*, a series on a native studies involving Eskimo and Indian students. Program contributions made to the national network included ten 90-minute programs on northern vacations for *Holiday* in June, July and August; eight 3-minute news for *Five Nights a Week* ("Mackenzie River, should it be built?", "The Great Northern Pipeline Debate", "Problems of Eskimos in southern prisons", "Communications — TV and Radio — in the far North", "How can the Whiteman help Natives participate more fully in Canadian Affairs?", "Eskimo Indians demand land", "Outbreak of infectious disease on Baffin Island among Eskimo children", and "Aboriginal rights of Eskimos in the Northwest Territories"); three 15-minute documentaries for *Schools Broad-*cast ("Oligbuck, Eskimo Explorer", "Punch and the Hudson Bay Pilot" and "The Hudson Bay Pilot — 1885"); and three 60-minute programs for *Between Ourselves* ("This Changing North" — the changing lifestyle of the Eskimo people, "ANIK — tv comes to the far North", "Christmas, where there are no trees" — a nostalgic look at Christmas in the Arctic.) Much of the content for these broadcasts was recorded by the northern

stations and presented by the Montreal Production Centre.

It was a busy year for special events. These included coverage of local and federal elections; Territorial council sessions; the Polar Games and the Arctic Winter Games trials; numerous carnivals, conferences and trade shows, oil and gas developments; and the launching of the ANIK satellite.

Plans for 1973

Operations

Frobisher Bay, from its inauguration in 1961, has received network radio programming by tape shipment. With the arrival of ANIK the station will receive its national radio network service by means of the second audio channel of the satellite's television signal early in the new year.

At Baker Lake, NWT, an F.M. station is being built by the Department of Communications. CBC is extending help to the Eskimo community by training staff, providing a shortwave receiver and recorded programs.

Technical assistance will be given to the community-owned and operated station at Pond Inlet, NWT. Recorded programs will be supplied and arrangements made to feed daily news in Eskimo and English by telephone from the CBC station at Frobisher Bay.

Traditionally, Northern Service listeners have had to rely upon fragmented broadcast days for their shortwave service. Only certain times of day were made available for transmission to the North on shortwave transmitters. The necessarily broken service made it very difficult for potential listeners to join transmission at only specified periods.

Due to the availability of a broadcast line 18-1/2 hours a day from the studio in Montreal to the Sackville shortwave transmitter, the Northern Shortwave Service will greatly expand the number of programs a day in 1973. Also, with improved transmitter facilities, due to increased power and an antenna array directed solely to the North, it is anticipated that this full broadcast service will be very much in the spirit of the increase in communications facilities across the North in general.

The use of Canada's first domestic communications satellite, ANIK, launched in November 1972, will bring new experience in listening and viewing to many Canadians who make their homes in the North. There

remain isolated groups of listeners who continue to look to CBC Northern Shortwave for new in Eskimo, English, French and Cree, and who are beyond reach of the satellite signal.

The new era of shortwave service represents possibilities for the development of broadcasts to northerners of particular linguistic groups and occupations, the nature of which distinguishes their need from others who receive a general national service of news, information and entertainment.

Plans for 1973

Programs

Plans include:

- Marking the RCMP Centennial this year with 13 quarter-hour programs featuring reminiscences of oldtimers and four hour-long documentaries on significant events involving the RCMP — "The Mad Trapper of Rat River", "Eastern Arctic Patrol", "Lost Patrol", "Story of the St. Roch". All the programs will also be distributed on transcription by Radio-Canada International.
 - *Ookpik* returns.
 - *Winds of Change* returns in the fall with a revised format expressing the desires and aspirations of young native people attending universities in southern Canada.
 - *Signals Unlimited* a bilingual program for shortwave hobbyists, planned for late summer or fall.
 - Resumption of production of Eskimo language dramas.
 - Continued emphasis at all Northern stations on improvements in information programming, especially consumer information programs.
 - Making use of the second audio channels of the satellite's television signal delivered to the North, to pre-release radio programs (including northern productions), to radio stations in the North for local broadcast.
 - To develop a northern television service in local periods not programmed by the national network.
- For national radio network contributions:
- a documentary for the June 22nd *Between Ourselves* on the Kluane National Park; dramatization of the life of Robert Service for *The Bush and the Salon*, in the fall;

- continuing coverage of significant northern aspect news stories for *Five Nights A Week*;
- items from the North will continue, on a regular basis, to *Shop Talk*, a syndicated feature dealing with labour matters.

CANADIAN NATIONAL RAILWAYS (CNR)

Responsibilities and Long-term Plans

Over the last decade CN has established a foundation for the development of an efficient transportation and telecommunication system in the North. At present these facilities are needed mainly to support oil and gas exploration and to supply northern communities. When better transportation becomes available, however, further development of resources in the North will be stimulated by the greater accessibility to markets. Canadian National will continue to investigate the feasibility of all forms of transportation for northern regions.

Review of 1972 Operations

1972 was a year of continued growth in telecommunications in the Northwest Territories, which consists of the northern portion of Alberta and British Columbia, the Yukon, and the western half of the Northwest Territories. Much of this growth was attributable to extensive oil and gas exploration and related pipeline studies.

Early in 1972 a microwave system linking Hay River and Yellowknife via Fort Providence was extended from the latter point to Fort Simpson. At the same time telephone data communications to serve Imperial Oil, Gulf, and Shell exploration drilling rigs were extended throughout the Mackenzie River area.

The Yukon Territory direct distance dialing was inaugurated at Whitehorse and automatic dial-telephone exchanges were installed at Old Crow and Arctic Red River. Long distance exchanges not connected to the long distance network were installed at Sachs Harbour, Pelly Bay, Gjoa Haven and Spence Bay. Fifty-eight exchanges were in service at the end of 1972, and 3,440 new telephones were installed, bringing the total to 21,000

(19.4 per cent growth). Long-distance operators handled 2,410,000 calls during the year, an increase of 23 per cent.

High frequency, single side-band radio service was introduced to the Arctic Islands on the 9 and 13 Megahertz bands.

During 1972 Canadian National continued its membership in Canadian Arctic Gas Study Ltd., the consortium of 25 Canadian and U.S. gas and transportation companies who are joint sponsors of the feasibility study for the Mackenzie Valley natural gas pipeline. While CN's main task in the consortium is to provide logistics planning advice, they also participated in many other aspects of the study. In the fall of this year the consortium plans to apply to the federal government for permission to build this pipeline.

In addition, during 1972 Canadian National incorporated a new logistics management company called Canalog Consultants Ltd. This new CN subsidiary has been formed to help deliver the massive amounts of material needed in future resource development projects across Canada. Canalog Consultants Ltd. will recommend the best traffic routings for its customers, negotiate on their behalf for transportation services, and monitor and expedite the movement of traffic. Although initially aimed at natural resource development, Canalog will be able to assist and advise any existing or prospective customer regarding transportation or associated services. Its first assignment will be to handle CN's participation in Canadian Arctic Gas Study Ltd. and, in conjunction with Canadian Pacific, to undertake the logistics planning for the proposed pipeline. It is hoped that this new company will assist future economic development in the North.

Plans for 1973

In 1973 long distance service will be provided to the communities of Pelly Bay, Spence Bay, Gjoa Haven, Wrigley and Rae. Direct distance dialing service is to be extended in 1973 to the communities of Faro, Elsa, Dawson, Watson Lake, Inuvik and Tuktoyaktuk. The microwave system will be extended to Norman Wells. In addition, CN Telecommunications will be building telephone exchanges at Hay River and Inuvik. The Norman Wells exchange building is being extended, as is the Hay River-Vale Island building. The latter extension is to house direct distance dialing equipment, scheduled for service in 1974, to accommodate the communities of Hay River, Yellowknife, Fort Simpson, Fort Smith and Pine Point.

Canadian National will continue its participation in Canadian Arctic Gas Study Ltd. through Canalog Consultants Ltd. Developments in the North will be closely monitored and CN will enlarge its study of other modes and combination of modes suitable to the transportation needs of the northern regions.

CANADIAN TRANSPORT COMMISSION (CTC)

AIR TRANSPORT COMMITTEE

Responsibilities

To ensure the orderly development of commercial air services in Canada.

Long-term Plans

To implement the objective outlined in responsibilities.

Review of 1972 Operations

Below is a listing of additional services in the North authorized by the Air Transport Committee in 1972:

List of licences approved in the Northwest Territories and Yukon during the Year 1972

<i>Carrier</i>	<i>Base</i>	<i>Licence No.</i>	<i>Class of Service</i>
Adventure Airways	Burwash Landing, Y.T.	2183/72(H)	5 (B)
Bradley Air Services	Eureka, N.W.T.	2193/72(C)	4 (BCD)N
		2193/72(C)	7RF (BCD)N
		2147/72(NS)	2 (AA)
International Jet Air Ltd.	Whitehorse, Y.T., serving: Inuvik	2168/72(C)	7AC (ABCD)N
Mid-Canada Aerial Contractors Ltd.	Whitehorse, Y.T.	2168/72(C)	7AIRA (ABCD)N
		2168/72(C)	7AP (ABCD)N
		459/72(CF)	9-4 (B)
Nahanni Air Services Ltd.	Fort Franklin, N.W.T.	2163/72(H)	4 (BC)
Nahanni Helicopters Ltd.	Fort Simpson, N.W.T.	2163/72(H)	7RF (BC)
		2219/72(C)	4 (A)N
		461/72(CF)	9-3 (AA)
Nahanni Air Services Ltd.	Norman Wells, N.W.T.	2135/72(C)	4 (A)N
		2135/72(C)	7RF (A)N
		2133/72(C)	4 (B)
Nordair Ltée, Ltd.	Frobisher Bay, N.W.T.	2133/72(C)	7RF (B)
		2134/72(C)	4 (B)
		2134/72(C)	7RF (B)
		2134/72(C)	7RF (B)
Northward Airlines Ltd.	Whitehorse, Y.T.	2135/72(C)	4 (A)N
		2135/72(C)	7RF (A)N
		2133/72(C)	4 (B)
Trans-North Turbo Air (1971) Limited	Whitehorse, Y.T.	2133/72(C)	7RF (B)
		2134/72(C)	4 (B)
		2134/72(C)	7RF (B)
Trans-North Turbo Air (1971) Limited	Inuvik, N.W.T.	2133/72(C)	7RF (B)
		2134/72(C)	4 (B)
		2134/72(C)	7RF (B)

Plans for 1973

To consider the following applications now pending before the committee:

- a) *Services with fixed-wing aircraft*

**Consolidated summary of applications to operate fixed-wing aircraft in the
Yukon and Northwest Territories**

eka s Aviation Ltd.	Class 4, Groups A,B,C,D.
olute dley Air Services Limited	Class 4, Groups A,B,C,D.
dair Canada Ltd.	Class 4, Groups C and E.
kin Inlet watin Air Limited	Class 4, Group B.
nbair Limited	Class 4, Groups A,B,C.
man Wells dair Canada Ltd.	Class 4, Groups C and E.
ik Lake watin Air Arctic	Class 4, Group A.
vik dair Canada Ltd.	Class 4, Groups C and E.
ndeer Air Services Ltd.	Amendment to Licence.
ndeer Air Services Ltd.	Relief from route protection.
avik Flying Services Ltd.	Relief from route protection.
ownknife ch West Territorial Airways Ltd.	Amendment to licence.
ch West Territorial Airways Ltd.	Amendment to licence.
ch West Territorial Airways Ltd.	Amendment to licence.
chward Aviation Ltd.	Class 9-4, Group AA.
chward Aviation Ltd.	Regrouping to AA.
way Aviation Ltd.	Relief from route protection.
Simpson ic Air Ltd.	Regrouping to D in addition to B.
erine Air Ltd.	Class 4, Group A.
Aviation Ltd.	Application for authority to operate a Class 7 Specialty – Flying Training – Aerial Inspection, Reconnaissance and Advertising – commercial air service from a base at Yellowknife, N.W.T.
dair Ltd.	Application for authority to add the points Arctic Bay and Pond Inlet to its present Class 3 service authorized under Licence No. ATB 1739/67(NS).

Services with rotating-wing aircraft

**Consolidated summary of applications to operate rotating-wing aircraft in the
Yukon and Northwest Territories**

ik ciated Helicopters Ltd.	Class 4, Group A-RW, C-RW
inion Helicopters Ltd.	Class 4, Group A-RW, C-RW
nagan Helicopters Limited	Class 4, Group A-RW, B-RW and C-RW
s-West Helicopters (1965) Ltd.	Class 4, Group A-RW
s North Turbo Air (1971) Limited	Class 4, Group A-RW, B-RW
man Wells ciated Helicopters Ltd.	Class 4, Group A-RW
inion Helicopters Ltd.	Class 4, Group A-RW
nagan Helicopters Limited	Class 4, Group A-RW
Simpson ciated Helicopters Ltd.	Class 4, Group A-RW
inion Helicopters Ltd.	Class 4, Group A-RW
nagan Helicopters Limited	Class 4, Group A-RW

Whitehorse Trans-West Helicopters (1965) Ltd.	Class 4, Group A-RW
Haines Junction Trans North Turbo Air (1971) Limited	Class 4, Group A-RW
Dawson City Trans North Turbo Air (1971) Limited Alpine Helicopters Ltd.	Class 4, Group A-RW Application for authority to operate a Class 4, Groups A-RW and B-RW charter commercial air service from a base at Inuvik, N.W.T.
Alpine Helicopters Ltd.	Application for authority to operate a Class 4, Groups A-RW, B-RW and C-RW charter commercial air service from a base at Norman Wells, N.W.T.
Alpine Helicopters Ltd.	Application for authority to operate a Class 4, Group A-RW charter commercial air service from a base at Fort Simpson, N.W.T.

CENTRAL MORTGAGE AND HOUSING CORPORATION (CMHC)

Responsibilities

design of housing, preparation of town development plans, and drafting of planning legislation as requested from time to time by the Department of Indian Affairs and Northern Development.

financing of housing under the terms of the National Housing Act.

Long-term Plans

The facilities provided under the National Housing Act and the services of Central Mortgage and Housing Corporation will be available wherever and whenever necessary.

Review of 1972 Operations

Effective 15 March 1972, Central Mortgage and Housing Corporation in Yellowknife, changed status from a representative office to a loan office. Increased staff and greater authority will enable the office to provide an improved level of service in the Northwest Territories.

Lending Activities

In 1972 a total of 269 new housing units were financed under the NHA, compared to 1971. Of these, 36 units were in the Yukon; 26 were financed by approved lenders, and 10 by CMHC; 233 units were in the Northwest Territories: 221 were financed by approved lenders and 12 by CMHC. Four loans for existing housing were made in the Yukon; two each by approved lenders and CMHC. In the Northwest Territories, 17 approved lenders and 3 by CMHC.

In addition, Central Mortgage and Housing Corporation provided loans for the construction of 91 units of public housing for

rental to low-income families. Of these, 40 single-family dwellings were in the Yukon: 20 in Dawson City, 10 in Haines Junction, and 10 in Ross River. Fifty-one units were constructed in the Northwest Territories: a 31-unit project in Inuvik and a 20-unit apartment building for low-income single persons in Hay River.

In addition to loans made available under the National Housing Act, second-mortgage loans were provided by the governments of the Yukon Territory and the Northwest Territories. CMHC administers the mortgage plan on behalf of the Territorial governments. During 1972 seven loans in the NWT and 25 in the Yukon were negotiated, bringing the total of second-mortgage loans to 154 since the program's inception in 1962. During 1972 seven of these loans were paid in full, 147 remained outstanding.

The corporation also approved a loan to the Town of Hay River in the NWT for acquiring and developing a 45-acre site to produce 95 residential lots and land for multi-family units.

Partnership Activities — Yukon Territory

Whitehorse

In April 1972 a contract was awarded for the construction of 40 units for families of low income. As of 31 December, construction was 95 per cent complete and 14 units were occupied.

Watson Lake

In April 1972 a contract was awarded for the construction of 10 units for families of low income. As of 31 December, construction was 95 per cent complete and all units ready for occupancy in early 1973.

Mayo

In April 1972 a contract was awarded for the construction of 10 units for low-income

families. By 31 December, construction was 95 per cent complete and all units ready for occupancy in early 1973.

Dawson City

In April 1972 a contract was awarded for the construction of 20 units for low-income families. By 31 December construction was 90 per cent complete and all units ready for occupancy in early 1973.

Partnership Activities — Northwest Territories

Yellowknife

A feasibility study is still under way on financing some 36 units for low-income families.

Hay River

On 10 November 1972 a contract was awarded for the construction of 16 units for senior citizens. As of 31 December preparation was well under way to begin construction in spring 1973.

Fort McPherson

On 12 May 1972 a contract was awarded for the construction of eight units for senior citizens. As of 31 December construction was 98 per cent complete.

Fort Good Hope

A feasibility study is being undertaken for construction of approximately eight units for senior citizens.

Fort Resolution

A feasibility study is being done for the financing of approximately eight units for senior citizens.

Sewage Treatment Loans

Yellowknife

Two loans were approved to construct sewage collection facilities consisting of

2,050 lineal feet of 30-inch sewage pipe,
1,235 feet of 24-inch trunk sewer and 280
feet of 8-inch outfall.

Hay River

One loan was approved for construction
of a sewage collection system consisting of a
lift station and 6,500 lineal feet of 8-inch
forcemain.

Research Grants and Studies Under Part V, NHA 1954

In 1972 the following Part V grants were
made in the Territories.

Yukon Association of Non-status Indians	Under the Winter Warmth programs to repair dilapidated houses	\$50,000.
Yukon Association of Non-Status Indians	Housing and demographic study of native people in the Yukon Territory	\$83,324.
Métis Association of the Northwest Territories	For Winter Warmth programs 1972-73	\$100,000.
Yukon Association of Non-Status Indians	For Winter Warmth programs 1972-73	\$133,400.
Centre for Settlement Studies of Manitoba	To enable the centre to continue to foster and sponsor research relevant to settle- ments in northern Canada	\$85,000.

Plans for 1973

Partnership Activities

The following public housing proposals
are being assessed:

Yellowknife	36 family housing units
Whitehorse	Two 2-bedroom apartment buildings of 18 units each, for 36 family housing units
Watson Lake	15 3-bedroom family housing units 10 4-bedroom family housing units
Carcross	5 3-bedroom family housing units
Carmacks	5 3-bedroom family housing units
Pelly Crossing	5 3-bedroom family housing units
Teslin	3 3-bedroom family housing units 2 4-bedroom family housing units
Haines Junction	20 units, need and demand survey under way
Dawson City	20 units, need and demand survey under way

OWN ASSETS DISPOSAL CORPORATION (CADC)

Responsibilities

Crown Assets Disposal Corporation is responsible for the sale of surplus assets received by government departments and agencies operating in northern Canada and, under a long-standing agreement, conducts sale of United States government surplus property located at DEW Line sites and other northern establishments. The corporation also has an agreement to act as agent of the Government of the Northwest Territories in the sale of their surplus assets.

Long-term Plans

The corporation will continue to provide service to federal government departments and to agencies of the United States government in the sale of their surplus assets in the north.

Review of 1972 Operations

Special sales were conducted during the summer and autumn at Whitehorse, Churchill and Goose Bay. The US surplus property located at DEW line stations was sold to individuals or organizations operating in the area.

Plans for 1973

The corporation will conduct normal disposal operations and be ready to assist in any special disposal problems that may arise at Canadian or U.S. establishments.

DEPARTMENT OF AGRICULTURE (AGR.)

Responsibilities

- through consultation and research, to provide technical assistance to those needing information on food production.
- to provide an identification and consultative service on insects, archnids, nematodes, plants, and soils to meet Canada's scientific and operational requirements in the North.

Long-term Plans

- to maintain our present low level of operation in the North unless future developments indicate a need for greater activity. See below for detailed plans.

Review of 1972 Operations

Northern Research Group, Beaverlodge, Alberta

The soil survey bulletin, *Soils of the Slave River Lowlands in the Northwest Territories 1972*, by J.H. Day, has been released through the Soil Research Institute, Agriculture Canada, Ottawa. This survey indicates the extent, characteristics and possible use for 26 soil types. Three of these soils, containing about half the arable potential, are being studied in detail at the Grand Detour research site, 40 miles north of Fort Smith.

Climate of the area has been recorded for five years. Mean temperature in °F, followed by the maximum and minimum, for the three summer months was, June 62, 86, 23; July 65, 84, 28; August 60, 85, 23. Average rainfall was 4.59 inches: 1.08 in June; 1.49 in July and 2.02 in August. The variance in occurrence and duration of precipitation during the summer thus determines the volume of growth that may be expected.

Because the July 1972 rainfall was only 0.3 inches, forage production was seriously

hampered. In addition summer frosts are prevalent. In 1972 there were nine days recording less than 28°F: three in June, four in July, and two in August.

Fire on the dry sedge-grass is an ever-present threat. In 1972 two fires occurred at the research area; one caused by accident and one by a lightning strike. In each case, fire crews, aided by a rainfall shortly after the fire began prevented a major disaster.

Investigation has revealed that much of the soil of the open-meadow type is excessively saline. Because of a drying trend this seems to be increasing.

In the fall of 1971 there was bison hunting in the area, and in the summer of 1972 the animals were observed to be very scarce at Grand Detour.

Plans for 1973

Plots of both native and introduced vegetation will be harvested as scheduled. The salinity of the soil will be investigated over a wider area.

Entomology Research Institute, Ottawa, Ontario

Through an agreement with the Freshwater Institute, Department of the Environment, the Entomology Research Institute is participating in the Mackenzie Valley pipeline survey. The Entomology Research Institute has undertaken to identify aquatic insects collected from the Mackenzie and Old Crow rivers and their tributaries: approximately 21,000 specimens have been identified. In support of this identification service two research scientists collected and studied blackflies and water beetles in the Fort Simpson and Mackenzie River delta areas. Taxonomic support was also provided for the International Biological Program projects on Cornwallis and Devon Islands.

Several papers on arctic insects were published including a list of species on Bathurst Island and a study on the sex ratio of chironomid midges. Four papers on the distribution of arctic and boreal insects were presented at a symposium on Holarctic Zoogeography held at a joint meeting of Canadian and American Entomological Societies.

Plans for 1973

The Institute will continue to identify aquatic insects collected by the Freshwater Institute in their study of the benthic fauna of the Mackenzie River and its tributaries. Three or four Institute personnel will help collect and study aquatic insects in the Mackenzie River area. Taxonomic support will also be provided for the IBP project on Devon Island.

As part of a continuing comparative study of the distribution of arctic Diptera (two-winged flies), a survey party of two or three people will collect in the Ogilvie Mountains. This range, in the heart of the Yukon region that escaped glaciation, was part of the Beringian refugium that included most of Alaska, yet it has never been thoroughly surveyed entomologically. There is a substantial probability that some species that have not expanded their range in postglacial times remain to be discovered there.

Plant Research Institute, Ottawa, Ontario

The Institute was again asked to participate in field work relating to the Canadian Committee for the International Biological Program/Conservation Terrestrial (CCIBP/CT) program (Panel 10) in the Western Mackenzie District. Ten sites which had been proposed for possible preservation were visited. Reports on these sites are being written.

A member of the staff took part in panel discussions of the Canadian Arctic Resources Committee meeting at Carleton University in 1972.

Four research papers on northern flora were published during the year.

Plans for 1973

No field work is planned for 1973 in either the Northwest Territories or the Yukon Territory.

It is anticipated that the manuscript for a flora of the Continental Northwest Territories, which is being prepared in co-operation with Dr. A.E. Porsild (retired from the National Museum), will be completed in 1973.

Research Institute, Ottawa, Ontario

A member of the Edmonton Soil Survey Unit continued pedological studies in connection with the Mackenzie Pipeline Corridor between latitudes 66 and 68°. A

member of our Winnipeg Soil Survey Unit is similarly engaged between latitudes 60 and 64°. The field work on this program is complete.

Another member of the Edmonton Soil Survey Unit conducted soil investigations on Devon Island at the IBP site. The detailed survey and field checking program is not yet complete. Map compilation is in progress.

A member of our Saskatoon Soil Survey Unit conducted soil investigations in the Mackenzie mountains. Nine sites covering about 86 square miles were characterized for the IBP-CT panel 10 program. Our involvement is completed.

Plans for 1973

The soil reports on the Mackenzie Valley Pipeline project will be completed. The IBP project on Devon Island will be completed and the soil report prepared.

DEPARTMENT OF COMMUNICATIONS (DOC)

Responsibilities

The Department of Communications was established to foster the orderly development and operation of communications for Canada in the domestic and international sphere. This includes:

- the development and introduction of new communications systems; the extension of telecommunications systems and services both short- and long-term which are in the best interest of Canada; the protection of Canadian interests in international telecommunications systems; and the allocation of radio frequencies to permit the orderly development and growth of radio communications.

The North is an area to which the department is devoting particular attention; studying the need for telecommunications, researching systems to meet those needs and co-ordinating and regulating the systems used by the telecommunications common carriers.

Long-term Plans

The aim of the department is to extend communications frontiers northward so as to eliminate regional disparities and to provide telecommunications services of the calibre of southern Canada. There are economic and political, as well as operational advantages in full national coverage, because communications have a potential for achieving social unity. The Department of Communications will co-ordinate communications planning for federal agencies requiring telecommunications services in the North. In consultation with provincial agencies, improved telecommunications services will be planned and constructed in the northern parts of the provinces. Emphasis will be given to the following:

Network Facilities Development

The objective for northern communications shall be to establish basic services throughout the country as follows:

- Telephone communication of a quality normally available in urban communities:
 - 24 hours-a-day service,
 - demand access to virtually unlimited subscribers,
 - operation by the user without training or special procedures,
 - quality of performance which adequately stimulates direct person-to-person verbal contact.
- Radio broadcast service which would be technically capable of providing the appropriate mix of local and national network programming.
- Television service, to at least the level of ITU "community reception" if not "individual reception", i.e. the reception of transmissions from a broadcasting satellite by simple domestic installations possessing small antennae. This TV service would include regional services for educational and other purposes.

Social and cultural aims

The objectives will be:

- to apply communications technology generally to the special needs of remote and isolated communities with priority given to the needs of native peoples
- to develop specific services for intra-community and inter-community communications, education, health and welfare, including the development and adaptation of appropriate hardware
- to develop within communities the technical capacity to produce services that will

promote the cultural aspirations of native peoples

Northern development and sovereignty

The proper exercise of sovereignty in the North requires telecommunications that are flexible in deployment and operation. Specifically:

- able to provide, on short notice, basic telecommunications services to all areas of the North, with standards similar to those in the South
- able to provide telephone and message service to mobile parties anywhere
- sufficiently flexible to rapidly expand communications facilities at any existing or newly established location

Implementation strategy

- To assess alternatives in planning a national communications network which will provide the mechanism for a proper balance of terrestrial and space systems to meet the many needs of northern communications.
- To rationalize federal and Territorial, industrial and private communications needs and systems in the interest of a cost-effective and co-ordinated network.
- Selection by the federal government of northern areas or communities suitable for field experiments in telecommunications so as to learn more about the desirable features of operational systems.
- Preparation of detailed plans for extending the domestic satellite communications configuration; in essence, an updating of plans to meet the objective of the white paper on satellite communications.

strengthening of consultation with provincial and Territorial authorities on their needs for educational and general telecommunications and broadcasting services for remote areas.

Review of 1972 Operations

1972 was a year of unparalleled achievement for Telesat Canada, culminating in the successful launching of Anik I, the world's first domestic communications satellite in synchronous orbit.

In July Telesat signed the first of its series of agreements with the Canadian Broadcasting Corporation for the lease of three RF channels. The CBC channels will carry live English- and French-language programming to some 30 isolated communities in the north which at present rely on airlifted videotape package programs or in some localities have no service at all.

The service will be relayed through videotape television stations which will be designed initially for television reception only, but can be upgraded for other forms of telecommunications.

In October Bell Canada leased two RF channels to provide its service to the Eastern Arctic. The first channel, with a capacity of 24 telephone circuits, will link southern Canada with Frobisher Bay and Resolute in the High Arctic. The second channel will initially provide Thin Route service, a small number of two-way message circuits, Pangnirtung, on Baffin Island and Igloolik, on the Melville Peninsula. Following signing of the agreement, Bell confirmed its plan to extend Thin Route service to 15 additional communities in the Eastern Arctic by 1974 and 1975.

The Department of Communications will sponsor the launching of an experimental telecommunications technology satellite in 1975 which will be of special importance to the north. By using a satellite with a high effect-to-transmitted power it will be possible to communicate with very small stations in remote communities using telephone, radio and television signals. While the smallest satellite earth station will use antennas having diameters of 15 feet, the stations working with the new experimental satellite will use antenna diameters of three to eight feet. Antenna sizes of this order permit inexpensive, transportable stations to be designed to serve the smallest communities with the full range of telecommunications services. The experimental satellite will have a lifetime of

two years. A program of communications experiments and demonstrations has been co-ordinated with universities and associations.

A district office has been opened in the community of Fort Smith, Northwest Territories to establish a local presence in the North. In Ottawa, the Northern Project Office was established in April 1972 to conduct a series of field experiments in several northern communities.

These experiments aim to establish the social communications needs and priorities for isolated regions, and to test the effectiveness of various communications media in meeting these needs. The communities of Rankin Inlet, Baker Lake, Chesterfield Inlet, Whale Cove and Eskimo Point have participated in the project in the Northwest Territories. The department has supported a program at Ryerson Institute of Technology which has produced a prototype of a low-cost FM broadcasting transmitter which, if field tests are satisfactory, may be used in small communities. An evaluation was completed of the social effectiveness of the Comminterphone experimental system at Rankin Inlet.

The DOC continued to provide financial support to CN Telecommunications to an amount of \$220,000 for the operation of the Mackenzie River pipeline system in the Northwest Territories. In the Eastern Arctic the Department of Communications, at a cost of about \$100,000 continued to support the operation of a tropospheric scatter terminal to provide telecommunications services from Frobisher Bay to southern centres over the Polevault system.

In 1972 in the Northwest Territories CN Telecommunications added new exchanges in Edzo, Gjoa Haven, Pelly Bay and Sachs Harbour. Exchanges at Cambridge Bay, Ft. Franklin, Ft. Good Hope, Ft. Resolution, Ft. Simpson, Ft. McPherson and Norman Wells, NWT and Mayo and Teslin, YT, were enlarged. Public Commercial VHF base stations were added at Port Radium and Rat Pass (second channels) and Morrisey, NWT.

Bell Canada made the following service improvements during the past year:

- a new telephone exchange was opened at Asbestos Hill
- switching equipment replacement and additions to provide for growth were undertaken at Fort George, (Quebec), Pikanigikum (Ontario), Northwest River (Labrador), and Eskimo Point (NWT).

- switching equipment improvements were undertaken at Big Trout Lake (Ontario) Fort Albany (Quebec) and Nain (Labrador).
- Improved and additional trunks were provided to Fermont (Quebec) by means of a new microwave system and to Fort Rupert by a new VHF system. The VHF system to Northwest River was improved and improved HF systems were provided at Koartac (Quebec), Northwest River and Nain (Labrador).

Plans for 1973

Telesat Canada's satellite communications system was ready for commercial operation in January 1973. Bell Canada started its Thin Route service into Frobisher and Resolute in January, and its Thin Route service into Pangnirtung and Igloolik in February. Improved and increased switching capacity was added coincident with these new services. Satellite service will be extended by Bell Canada to Fort Chimo and Povungnituk in Quebec, Big Trout Lake (Ontario) Rankin Inlet, Baker Lake and Coral Harbour (NWT). In addition, the Ontario Northern Transportation Commission (O.N.T.C.) will introduce this service to Winisk. This will occur in November and December. Although the CBC service was contractually to begin on 1 April construction work and technical installations are well ahead of schedule. The satellite communications system is not limited to the transmission of commercial television, but is also capable of carrying educational programs to the northern regions of Canada.

Construction will begin on seven of the 15 additional stations planned for Bell Canada's Thin Route message service. These stations, to be ready for service by the end of 1973, will be located at Sugluk and Port Harrison, in Quebec; Cape Dorset, Eskimo Point, Pond Inlet, Arctic Bay, Clyde River and Chesterfield Inlet in the Northwest Territories.

The department intends to continue its evaluation of the experimental HF system in the Keewatin and a community radio station at Baker Lake, NWT. In addition, the Northern Project Office will embark on studies into the use of video-tape recording equipment in these areas. This evaluation should lead to a firm basis for broader policy development and for defining criteria and operating methodologies for communications systems in which users are directly involved and for which they have a direct responsibility.

Plans are being pursued for a modest program of research into the social impact of services to be provided by the Anik satellite. Further work will be carried out on the development of a co-operative program of social impact experiments to be conducted on the Communications Technology Satellite which will be for the express benefit of the North.

Bell Canada is planning to install new switching machines to provide increased capacity at Poste de la Baleine, Povungnituk and Fort Chimo in Quebec, Winisk, Ontario and Coral Harbour, NWT. A new building will be provided at Sandy Lake, Ontario to house the exchange equipment.

New improved solid-state HF equipment will be installed at Ivugivik, Wakeham Bay and Port Nouveau Quebec.

Trunk capacity from Wabush to Emeril will be increased with the installation of a new VHF system parallelling the existing UHF system.

Some improved operating procedures will result from the establishment of a toll centre at Goose Bay.

CN Telecommunications propose to provide new exchanges in Fort Liard, Spencer Bay and Wrigley in the NWT. They also propose to enlarge their exchange facilities in the following communities in the Northwest Territories: Arctic Red River, Cambridge Bay, Coppermine, Edzo, Enterprise, Ft. McPherson, Ft. Providence, Ft. Smith, Inuvik, Norman Wells, Pine Point, Rae and Yellowknife. Exchange enlargements are also planned in the Yukon for the communities of Clinton Creek, Mayo, Porter Creek, Ross River and Whitehorse. It is proposed to establish VHF base stations for mobile services in the communities of Taglu, Snare and Ft. Good Hope in the NWT and Muncho Lake and Mould Creek (Coal River) in the Yukon.

DEPARTMENT OF ENERGY, MINES AND RESOURCES (EMR)

CANADA CENTRE FOR REMOTE SENSING (CCRS)

Responsibilities

The Canada Centre for Remote Sensing is responsible for co-ordinating a national program to monitor Canada's earth resources in the near-earth environment. The centre's major aim is to provide the country's resource managers with remotely-sensed imagery and other data to aid them in the effective handling of resource assets. The major users of remote sensing in Canada include federal government departments which are directly involved in economic development and ecological assessment in the North. The centre carries on a program of airborne space-borne remote sensing in support of these.

Long-term Plans

The centre will continue to gather and analyze the use of remote sensing imagery data, much of which will cover Canada's North. The ERTS-1 Satellite is of particular interest in these regions where the orbits overlap progressively, allowing more frequent coverage of an area. This satellite will continue to operate until 1976, and Canada is shortly beginning negotiations with the United States for the utilization of the second in this series, ERTS-B. The addition of a thermal channel to this satellite's multi-spectral scanner will increase its usefulness at night time hours, and will more than double the production of imagery on the North.

Review of 1972 Operations

Airborne remote sensing

Two airborne remote-sensing missions were completed in the Northwest Territories

during 1972. The first was staged in the Mackenzie corridor and was an investigation of the multispectral signatures of area vegetation for the Forest Management Institute (Department of the Environment). The second was a study of Karst landforms and attendant groundwater patterns in the area of the South Nahanni River.

Both of these projects were carried out with a newly acquired Falcon Fan Jet aircraft the extended range of which has improved the centre's high-altitude capability in Arctic areas where suitable landing strips are scarce. In addition, the centre administers a project for the development of novel remote-sensing devices, the most promising of these being a microwave holographic device for studying ice thickness and state. The equipment, developed by a team at the University of Toronto, was tested at Tuktoyaktuk in May, with very promising results. Another is a laser fluorosensor, having applications for detecting oil slicks on water, for studying oil pollution, and for monitoring pipeline leaks.

Satellite remote sensing

One of the centre's major activities is to receive and process Canadian imagery from ERTS-1. This is the first in the Earth Resources Technology Satellite series planned by the National Aeronautics and Space Administration in the United States.

The satellite, launched at the end of July, provides multispectral imagery up to 81° North latitude and, although coverage recurs once every 18 days at lower latitudes, there is a great deal of image overlapping in the Arctic regions. This, coupled with widespread absence of cloud cover, means that repeat observations of an area can often be made several days in a row. To take advantage of this, initial ice movement studies have

been completed which delineate ice shifts on a previously unobtainable synoptic scale. Applications studies were initiated in northern areas in several other disciplines.

Plans for 1973

In accordance with the increasing interest in these projects by the centre's major users, further airborne remote-sensing projects will be carried out in northern regions. Imagery on Canada from the ERTS-1 satellite will continue to be received and processed.

The number of federal government agencies evaluating the application of ERTS imagery in the North continues to increase. They now include Ice Central, Defence Research Board, the ALUR Project (Indian Affairs and Northern Development), the Polar Continental Shelf Project (Energy, Mines and Resources), and the Glaciology Division of Inland Waters Branch (Environment). The Department of Energy, Mines and Resources plans to use ERTS imagery in connection with routing studies for Arctic oil and gas pipelines. In addition, several oil exploration companies, as well as such universities as Brock and McGill, have undertaken similar investigations.

The Canada Centre for Remote Sensing will be placing a high priority on developing applications for remote sensing, and in view of increasing interest in the North, several demonstration projects will be directed here. In areas of unusual activity, such as the Mackenzie Corridor, or regions of development of Arctic Oil and Gas the study of both airborne and space-borne remote-sensing imagery will be co-ordinated by the centre. These "key investigations" will involve extensive co-operation with user agencies, and are expected to enhance the technique in resource and environmental management. During 1973 the centre will be placing major

emphasis on the development of automated methods of interpretation for the comparative analysis of ERTS and airborne imagery.

EARTH PHYSICS BRANCH

Division of Geomagnetism

Responsibilities

The Division of Geomagnetism provides information on the direction and intensity of the earth's magnetic field over Canada, and neighbouring ocean areas. Such data have an important application for all types of navigational charts: other practical applications arise from the magnetic properties of rocks in the earth's crust. In addition to investigating large-scale geological structures by magnetic methods, the division supplies basic data for the more detailed commercial exploration of deposits of minerals, oil and gas. The magnetization of rocks is analyzed in field and laboratory studies to learn when and how geological structures were formed. The division also records and analyzes the more rapid variations of the geomagnetic field; the fact that much of the northern auroral zone lies within the Canadian land-mass gives Canada a special responsibility for this kind of research. Studies of rapid magnetic variations have practical applications in the North for telecommunications, long-distance transmission of electric power, and the investigation of deep crustal structure by electromagnetic induction.

Long-term Plans

At intervals of five to 10 years three-component airborne magnetic surveys are planned for the North, including the Canadian sector of the Arctic Ocean. Some 50 magnetic repeat stations are reoccupied at five-year intervals in a continuing study of the magnetic secular variation. The history of the formation of the Arctic Basin will be studied using paleomagnetic data from the Arctic Islands, through the magnetic anomalies revealed by airborne surveys, and through further field investigations by electromagnetic induction of the northern edge of the Precambrian Shield. The network of permanent magnetic observatories will be supplemented by unattended automatic recording stations, especially during the International Magnetospheric Study, 1976-1978.

Review of 1972 Operations

A 60,000-mile three-component airborne survey covering the Yukon, District of Mackenzie, Alberta and Saskatchewan was accomplished in late 1972: survey lines were

20 miles apart. A special survey was made of a reported anomaly in declination on the western approach to Inuvik airport. Twelve repeat stations were occupied in northern Quebec, Labrador and southern Baffin Island. A study was published of the magnetic anomaly over Darnley Bay, NWT, where a striking gravity anomaly was previously reported. A contoured map of large-scale magnetic anomalies over the Canadian sector of the Arctic Basin was published. With the co-operation of the polar continental shelf project, studies of electromagnetic induction north of Ellesmere Island were continued. Magnetic recording stations operated at five locations on the ice of the Lincoln Sea, extending 120 miles from the coast. Paleomagnetic investigations were carried out in the vicinity of Great Slave Lake, Great Bear Lake, and the Labrador Trough.

Magnetic observatories operated continuously during 1972 at Baker Lake, Churchill, Mould Bay, Poste de la Baleine, and Resolute Bay. After 11 years (one sun-spot cycle) of operation, the observatory at Alert was closed in September. A new magnetic observatory at Cambridge Bay began operation in April. Six unattended magnetic-recording stations in a north-south line passing through Churchill operated in support of auroral and rocket research programs. Special observations were carried out near Rankin Inlet during the solar eclipse of 10 July.

Plans for 1973

Two parties will reoccupy magnetic repeat stations in the Arctic Islands. Special attention will be paid to the region of the north magnetic dip pole. Portable magnetic recording stations will be operated during the survey to provide data for crustal studies by electromagnetic induction, and for correcting survey observations for time variations. There will be paleomagnetic collections in the Belcher Islands and Great Slave Lake region and a new magnetic observatory will be constructed near Yellowknife.

Division of Seismology

Responsibilities

The Division of Seismology provides a seismological risk and engineering seismology service in northern Canada and studies all thermal aspects of permafrost. Research in the Arctic lithosphere is conducted by deep-sounding experiments (often in co-operation with the Polar Continental Shelf Project), by surface wave dispersion studies

and by geothermal methods. To meet the objectives, networks of seismic observatories are deployed in northern Canada to take advantage of the low-noise terrain; field experiments on deep seismic sounding or microseismicity are conducted; and, in co-operation with industry and other government agencies, boreholes are preserved and measured.

Long-term Plans

The seismological observatories will be maintained and kept technologically up to date: some temporary expansion may take place in key areas of the Arctic islands, and strong-motion instrumentation may be added at a few sites. Field research on microseismicity and tectonics may be extended to the high Arctic.

Deep crustal seismic sounding experiments are planned for the Arctic Ocean Basin, and are under study in northern Quebec and Labrador. Co-operative studies of the underground thermal regime of northern Canada will continue with the Polar Continental Shelf Project and resource industries in the Arctic archipelago. In the Mackenzie valley engineering geology studies are also continuing.

Review of 1972 Operations

First-order seismic observatories were operated at Alert, Mould Bay, Resolute, Inuvik, Yellowknife, Baker Lake, Churchill and Schefferville. The first-order seismic station at Great Whale River was moved and converted to an electronic regional seismic observatory, operated under contract by the Institute of Northern Studies, Laval University. The regional seismic observatory at Whitehorse continued to operate, as did the strong-motion site at Fort McPherson. To house an on-line digital computer, an extension to the laboratory at the Yellowknife array was begun.

Field seismicity studies were conducted in the northern Mackenzie valley by five parties during a two-month period. Field work continued on about 30 deep wells drilled by resource development industry in the Arctic to investigate the thickness and distribution of permafrost in northern Canada and to study its relationship to terrestrial heat flow, the surface temperature history, and the surface topography.

In holes drilled by the Geological Survey of Canada, studies continued on the shallow permafrost regime of the Mackenzie Valley. Studies were also conducted on the thermal

properties of overburden frozen cores which are extracted from drillings in the Mackenzie Valley and were subsequently analysed in Ottawa.

In co-operation with a G.S.C. oil company, an experiment to outline the basin depth structure, long-range refraction studies will be conducted by three field parties during April and May in the Sverdrup Basin.

Plans for 1973

An on-line digital detection processor will be installed at Yellowknife, and preliminary work began on a new wide-band down-hole system. Seismic observatories in other localities will be calibrated and up-dated, and, if necessary, plans will be made to extend the environmental studies in the high Arctic.

Continuing geothermal studies will be intensified, as the pace of resource development increases: experimental work on permafrost degradation near shorelines will commence at Little Cornwallis Island and possibly elsewhere. Results from these studies and projects will continue to be published in scientific and technical journals. Industry, the public, and scientific communities.

Gravity Division

Responsibilities

In co-operation with the Polar Continental Shelf Project of the department, the Gravity Division is responsible for completing the regional gravity survey of the Canadian North. Precise observations of gravity provide basic data for the mineral exploration industry, for basin studies and for studies of the earth's crust and upper mantle; in addition, these observations provide data for studies in physical geodesy and meet the needs of the Department of National Defence. The division is also responsible for maintaining gravity standards in Canada's North by establishing a first-order gravity network to serve as reference and control points for all other regional and local gravity surveys conducted in the North, and for maintaining a bank of all gravity data which meet national standards.

Long-term Plans

The main objectives of the gravity division's program in the North are to map the gravity field at intervals of about 9 1/2 miles (15 km) or less over the land and water-ice-covered regions of northern Canada, to maintain a first-order gravity network in northern Canada, to develop and improve

methods of measuring gravity under unstable conditions such as in ice-covered regions, and to study long- and short-term vertical and horizontal movements of the Arctic sea ice. Within the division gravity and other related data will continue to be used for studies of the structure of the crust and upper mantle, isostasy and vertical movements of the crust, and physical geodesy. The gravity division is also an active participant in the Arctic Ice Dynamics Joint Experiment (AIDJEX), an international multi-disciplinary program of scientific investigations that will be carried out in the Arctic in the next few years.

Review of 1972 Operations

A new absolute reference network for Canada has been calculated and adjusted in accordance with the recently adopted International Gravity Standardization Network (1971). This new standard will be implemented in 1974 when a new issue of the Gravity Map of Canada is published.

During 1971 approximately 1,700 new gravity stations were observed in the Canadian North. Surveys were made on the Beaufort Sea to intensify existing station density in that area and on Victoria Island. Unfavorable weather prevented completion of the latter survey; the northwest of the island remains unsurveyed. A gravity map of Banks Island was published, with a report describing the 1971 survey of the island.

During April an AIDJEX pilot study was conducted in the Beaufort Sea from a main camp located about 312 miles (500 km) north of Point Barrow, Alaska. Continuous measurements of ocean tilt were made using instruments developed and modified in the division's laboratories.

Earth tide recording gravimeters operated at two locations in the Canadian Arctic. One interesting series of measurements was made on the sea ice at the AIDJEX project camp, where, for several days, a recording gravimeter tested whether the effect of ocean tides could be recorded on sea ice. While the records are noisy, the results are sufficiently encouraging to warrant further testing. Finally, as part of the regular work of measuring earth tides, a meter was in operation at Alert throughout most of the year. This location will eventually be the most northerly point of a north-south traverse within Canada.

Plans for 1973

A helicopter-supported gravity survey of the northern half of Amundsen Gulf will be

conducted during March and April. Approximately 1,000 gravity observations are planned. During August this coverage will be extended southwards to the central part of the gulf by 2,000 line-miles of shipborne surface gravimeter traversing. These measurements will be taken aboard the *CSS Parizeau* in co-operation with the Geological Survey of Canada and Environment Canada.

Further tests will be made of the automatic tilt recording system to be used in the AIDJEX program planned for 1975.

Analyses and interpretation of gravity data in relation to geology and other geophysical data will be carried out in the Mackenzie delta — Beaufort Sea area and, in the area underlain by the Sverdrup Basin. The latter project will involve a major study of crustal structure.

GEOLOGICAL SURVEY OF CANADA (GSC)

Responsibilities

To provide a comprehensive inventory and understanding of the geological framework and processes in Canada as a basis for national policy and planning in all matters affected by geology, with special emphasis on:

- ascertaining our national energy and mineral resources
- facilitating their exploration and development
- promoting regional development in Canada
- identifying and describing geological features and processes that affect environmental and ecological equilibrium, with particular emphasis on the effects of energy and mineral development
- identification and inventory of quaternary and recent features and on-going geomorphological processes that affect use of the terrain, engineering design, urban development, and the renewable resource industries (forestry, agriculture, fisheries)
- identifying and assessing natural hazards
- disseminating information on the Canadian landmass and surrounding continental shelves and the resources they contain.

Long-term Plans

Activities of the Geological Survey of Canada are grouped under seven principal headings as follows:

Geoscience surveys and analyses

- national systematic mapping at various scales, of bedrock, surficial materials, various air and ship-borne geophysical surveys, reconnaissance geochemistry etc.
- regional and topical investigations: including geological analyses of socio-economic regions, sedimentary basins, geological sub-provinces, geomorphic regions, volcanic piles, mobile belts etc.

The geological appraisal of mineral and fuel resources

- geology of fuel and mineral deposits
- identification, delineation and description of basins and metallogenic provinces
- qualitative assessments of potential for mineral and fuel commodities by geological map-units, sub-provinces etc.
- quantitative appraisal of the national endowment (known and unknown) in minerals and fuels, nationally and regionally

Geology of man's environment

- environmental geology, geomorphology and geotechnical studies of urban areas
- investigations of properties of geological materials and formations that affect land use, engineering design, terrain sensitivity, natural hazards and environmental and ecological equilibrium
- geological processes and dynamic relationships of the terrain including erosion, sedimentation, slope stability, permafrost etc.

Development in the geosciences

- guidelines for exploring energy and mineral resources
- methods for geological inventory and resource exploration
- geoscience instruments
- field and laboratory procedures

Geoscience standards, controls, and references

- standards for national geological mapping and correlation: stratigraphy, petrology, structure, tectonics etc.
- a national time scale — palaeontology, isotopic geochronology and palaeomagnetism

- control studies to determine geological relationships and processes and to test hypotheses
- classification and nomenclature of geological entities

- reference collections and catalogues

Scientific support

- specialist consultation and collaboration
- laboratory services

Information systems

- information processing, editing, cartography etc.
- information distribution
- library services
- geoscience data systems

A majority of field and laboratory projects are undertaken by survey staff. An increasing percentage of the budget, however, is now being spent on projects and services carried out under contract by private companies and individuals.

Review of 1972 Operations

During the 1972 season, 40 of the Geological Survey's parties north of 60° were in the field for a month or more. In addition, many important studies involving shorter field components were continued. Preliminary reports resulting from many of these projects were made available to the public on 8 January 1973 in the Geological Survey's "Report of Activities, April to October, 1972" (Geological Survey of Canada Paper 73-1, Part A).

Thirteen projects were carried out as part of the Environmental Social Program Northern Pipelines, of the Task Force on Northern Oil Development, Government of Canada.

A study of the stability of banks of the Mackenzie River and its tributaries was carried out between Fort Providence and Fort Good Hope. In conjunction with this study, the role of groundwater in various types of mass movement is being investigated by a contract employee.

Studies were concluded on the effects of erosion in a permafrost environment, begun in 1969 at the site of the Inuvik forest fire.

Terrain sensitivity studies continued in the Mackenzie Valley Transportation Corridor, in support of which a five-week drilling program was carried out in the Norman Wells area in March and April. Forty holes,

up to 200 feet deep, were drilled at sites chosen to represent differing surficial geological materials. Later in the summer two officers of the survey spent six weeks in the same area studying the response of various soil and rock materials to different types of natural and man-made disturbances. Studies of terrain disturbance associated with exploration activities in the southern half of the Delta were carried out at sites abandoned between 1960 and 1971. While attempts were made in most cases to minimize thermal disturbance, the depth of thaw was nevertheless 50 per cent greater in the well-head area than in areas where the terrain was undisturbed.

The project continued to provide inventory surficial geology and permafrost distribution data pertinent to pipeline construction, road building and other land-use activities in the Mackenzie Valley Corridor. During the pre-field season period, photographic interpretation maps were prepared at a scale of 1:125,000. These were checked in the field and 109 short (less than 10 feet) boreholes were drilled.

A study to provide information on the availability and quantities of natural construction materials, with emphasis on areas of possible future shortage, was initiated in the Mackenzie Valley and Delta. A similar study, also being produced for Indian Affairs Northern Affairs Department, involves the assessment of more than 40 maps (scale 1:250,000) covering most of the area between the Alberta border and the Beaufort Sea. Bedrock data for this inventory are derived mainly from unpublished GSC reports; whereas the surficial geology data are already available in open file reports.

Sedimentary and geomorphic processes are being studied on the Yukon Coastal Plain in order to assess potential impact on various human activities, and mapping for publication at 1:125,000 was continued in the area.

A study was carried out to determine the nature and distribution of offshore permafrost in the Eskimo Lakes-Liverpool Bay Continental Shelf area. This will assist in the interpretation of seismic reflection data.

Terrain performance studies on Melville Island, begun in 1971, were continued. The project is designed to prepare case histories of terrain performance encountered by fields, roads and "overland" vehicles. Studies were begun on western Fosheim Peninsula, Ellesmere Island. Inventory mapping of the surficial deposits was carried out in conjunction with both the Melville

nd and Ellesmere Island studies. Such information, in addition to filling gaps in existing knowledge, is needed as a basis for future planning and regulation.

Bedrock mapping of a late Precambrian sedimentary sequence in the southern Franklin Mountains disclosed the previously unreported presence of widespread, though sporadic, traces of copper mineralization throughout a 3,500-foot-thick interval.

The reconnaissance bedrock mapping of the Rignés Island, begun in 1971, was completed. The information gained is being used to determine the significance of the structure and stratigraphy on the genesis and accumulation of hydrocarbons in the area.

Mapping of the western half of Grinnell Peninsula was continued as part of the inventory mapping program of the branch, and study of the evaporites of the Baumann Formation of central Ellesmere Island was completed. Evaporites are usually associated with piercement domes in the Arctic and petroleum region and the study of their structures is designed to better evaluate their importance to hydrocarbon accumulation.

Studies on a succession of clastic rocks of Cretaceous age in the Canon Fiord area of Ellesmere Island were begun. Minor copper mineralization was observed; while not of economic importance, it is of interest from a tectonic point of view. The stratigraphic correlation is broadly comparable to that of the clastic deposits of Little Cornwallis Island, though differing in detail.

A major project carried out in 1972 was a geochemical survey of about 35,000 line miles of the Canadian Shield east of Bear Lake. Lake sediments and surface waters were systematically sampled at a density of one per ten square miles. The study had three principal purposes: mineral exploration, geochemical mapping, and geochemistry of the environment. Three helicopters were used in the sampling and about 100 sites were sampled. Initially the data being published in a series of contoured maps. Three 1:250,000 maps have been completed to cover the area and the concentration data for at least eight elements will be presented in this form. The first maps were scheduled for release in April 1973.

The study was begun of the metasedimentary group of rocks (Prince Albert Group) outcrops in a northeast-southwest trending belt west of Committee Bay (District of Keewatin). The purpose of the study was to determine the structure, stratigraphy and petrology of these rocks and

their relationship to adjacent gneissic rocks and the basic and ultrabasic rocks they enclose. While iron-formation is widespread in the metasediments, it is not sufficiently extensive to be economically significant. No other minerals of economic importance were found.

Other detailed studies of Precambrian geology included a study of the granitic and associated rocks of the Committee Bay area; the geology of the boundary between the Bear and Slave geological provinces in the Indian Lake area; mapping at a scale of 1:50,000 in the East Arm of Great Slave Lake; integrated volcanic stratigraphic and metallogenetic studies in the Rankin Inlet-Ennadai Belt, and a study of the volcanic rocks of the Prince Albert Group near Committee Bay.

Inventory mapping at a scale of 1:250,000 was completed in Yellowknife and Hearne Lake map-areas and similar studies designed to upgrade knowledge of the Precambrian geology and to assess mineral potential were begun in Gibson-MacQuoid Lake area (District of Keewatin).

Aeromagnetic surveys were continued in various parts of the Northwest Territories in 1972. In the District of Mackenzie about 71,000 line miles were flown, mainly east of 96° W (NTS 56 E-L, 66 A-D), and 80 one-inch to one-mile maps were published from data derived earlier from the same general operational area. About 2,400 line miles were flown in Melville Peninsula, the site of a projected 1973 reconnaissance bedrock mapping program.

The Geological Survey participated in a co-operative project involving government and industry in a seismic refraction survey in Sverdrup Basin. By the end of 1972 a report had been submitted to the six initial oil company subscribers.

Shallow seismic refraction surveys were also conducted in support of surficial geology mapping activities along the Yukon coast and at various places along the Mackenzie Valley.

About 9,200 line miles of gamma-ray spectrometry data were collected from the western half of that part of the Bear-Slave geological provinces covered by the major geochemical survey already described. Preliminary results were released in Geological Survey of Canada Paper 73-1, Part A.

An assessment of colour aerial photography in map-area 86F was continued and stereocoverage for about 4,500 square miles is now available. Pertinent data are being

placed on open file and prints will be available from the National Air Photo Library.

Plans for 1973

Many of the projects reported on for 1972 will be continued during the 1973 field season.

Standard bedrock mapping, as part of the Systematic Geological Mapping activity to develop the National Geoscience Base, will be carried out in northern Yukon and western District of Mackenzie, northern Ellesmere Island, and Indian Lake, Calder River and Sloan River map-areas, District of Mackenzie. A helicopter-supported reconnaissance survey of northern Melville Peninsula is planned; this will complete the mapping of the last major unmapped part of Canada on a reconnaissance scale.

Standard surficial mapping will be carried out in connection with continuing studies along the Mackenzie Valley Transportation Corridor, on Melville, Ellesmere and the Ringnes Islands and in Magway River and Dubawnt River areas, District of Keewatin.

As part of the Standard marine bedrock and surficial mapping activity (National Geoscience Base), marine geological investigations designed to determine the geological history of the "Northwest Passage Basin" are planned for the Lancaster Sound area. Off-shore unconsolidated sediments will be studied in the area of the Beaufort Sea adjacent to Mackenzie Delta, a project begun in 1970.

Aeromagnetic surveys, part of the national federal-provincial program, will be flown in several parts of the North to aid the overall geological mapping program and assist the mining and oil industries in exploration and geological research. More than \$900,000 has been budgeted for such work which is carried out under long-term contracts.

Airborne gamma-ray spectrometry techniques will be applied in an experimental geochemical survey to be flown between Port Radium and Coppermine.

As part of studies of sedimentary basins, field work will be carried out in the Belcher Channel area, on Ellesmere and Axel Heiberg Islands, in northern Yukon Territory, Banks Island and on the Ringnes Islands. In addition, seismic refraction work will be continued in the Sverdrup Basin.

As part of a program of regional analyses and syntheses, studies will be carried out in various geological provinces.

Work will continue on the Hurwitz group rocks of southwestern Keewatin in order to

assess their potential for mineral occurrences. On Melville Peninsula, the Penrhyn group of metamorphic gneiss and schist will be studied in some detail as will the metamorphic, sedimentary and volcanic rocks of the Prince Albert group.

In order to provide data on the relationship between geological parameters and mineral deposits, studies will be started in the Pelly Mountains, Yukon Territory and in the St. Elias Mountains.

An examination of Archean volcanic rocks in the Bear-Slave-Provinces will begin as will a study of granites of the Bear Province.

Paleontological and similar studies necessary to maintain the Standards and Controls activity of the Survey will be carried out in many parts of the North although most involve neither lengthy field programs in any specific area nor large expenditures.

Projects dealing with terrain sensitivity, engineering hazards, permafrost and geomorphology, described under the 1972 operations, will be continued and in some cases expanded to meet the growing need for such information.

The dispersion pattern of rock, mineral and chemical components of eskers and tills is considered to be a potential tool for mineral exploration. One such study was mentioned in the review of 1972 activities; similar work is planned for the Maguse-Dubawnt river area, District of Keewatin.

A high resolution rubidium vapour aeromagnetic survey system will be designed, built and tested using the Survey's Queen Air aircraft over Amundsen Gulf; the value of such a technique as an aid to geological mapping will be evaluated.

Reports Relating to the Northwest Territories and Yukon Territory, published by the Geological Survey of Canada in 1972

Memoirs

Memoir 357 Geology of Mayo Lake, Scougan Creek and McQuesten Lake map-areas, Yukon Territory; L. H. Green

Memoir 364 Geology of Nash Creek, Larsen Creek, and Dawson map-area, Yukon Territory; L. H. Green

Bulletins

Bulletin 212 Lower Cambrian trilobites from the Sekwi Formation

type section, Mackenzie Mountains, northwestern Canada; W. H. Fritz

Papers

Paper 69-36 Surficial geology of northern Yukon Territory and northwestern District of Mackenzie; O. L. Hughes

Paper 70-46 A radiometric profile across part of the Canadian Shield; A. G. Darnley, R. L. Grasty and B. W. Charbonneau

Paper 70-70 Mineral exploration and mining activities, mainland Northwest Territories, 1966 to 1968 (excluding the Coppermine River area); R. I. Thorpe

Paper 71-12 Reconnaissance of lower Paleozoic geology, Phillips Inlet region, north coast of Ellesmere Island; H. P. Trettin

Paper 71-13 Devonian spores and conodonts of Melville and Bathurst Islands, District of Franklin; D. C. McGregor

Paper 71-14 Upper Paleozoic stratigraphy of the Eagle Plain Basin, Yukon Territory; H. L. Martin

Paper 71-15 Biostratigraphic determination of fossils from the sub-surface of Yukon Territory and District of Mackenzie; B. S. Norford *et al*

Paper 71-28 Early Devonian land plants from Bathurst Island, District of Franklin; F. M. Hueber

Paper 71-33 Regional geochemical exploration in the Coppermine River area, District of Mackenzie; a feasibility study in permafrost terrain; R. J. Allan and (in part) J. J. Lynch and N. G. Lund

Paper 71-38 Artillery Lake Map-area (70-0 E 1/2) — District of Mackenzie; J. A. Fraser

Paper 72-25 Occurrences of exotic breccias in the Petitot Islands (85H/10) and Wilson Island (85H/15) map-area, East Arm of Great Slave Lake, District of Mackenzie; E. W. Reinhardt

Paper 72-1A

Report of Activities, Part April to October 1971; contains 15 reports on Franklin District, 8 reports on Keewatin, 27 reports on Mackenzie, and reports on the Yukon Territory.

Paper 72-1B

Report of Activities, Part November 1971 to March 1972; contains 6 reports on the Northwest Territories, 2 reports on the Yukon Territory.

Open Files

Open file 82

Stratigraphy, facies and paleogeography of Mesozoic and Tertiary rocks of northern Yukon and northwest Mackenzie District, NWT. (NTS 107B), 106M, 117A, 116C (N 1/2), 116I, 116H, 116K (E 1/2); J. A. Jeletzky

Open file 86

Bathurst Island Group and Byam Martin Island, Arctic Canada (Operation Bathurst Island); J. W. Kerr

Open file 87

Geology and mineral deposits of Yukon Territory and part of southwest District of Mackenzie, Northwest Territories. D. C. Findlay Scale: 1:1,500,000

Open file 88

Greely Fiord (east half) map-area, Arctic Islands (NTS 340A); R. Thorsteinsson

Open file 89

Lake Geochemistry — A low sample density technique for reconnaissance geochemical exploration and mapping of the Canadian Shield; R. J. Allan, E. M. Cameron and C. Durham

Open file 91

Side Scan Sonar and Echo Sounding Data, Beaufort Sea; J. M. Shearer

Open file 93

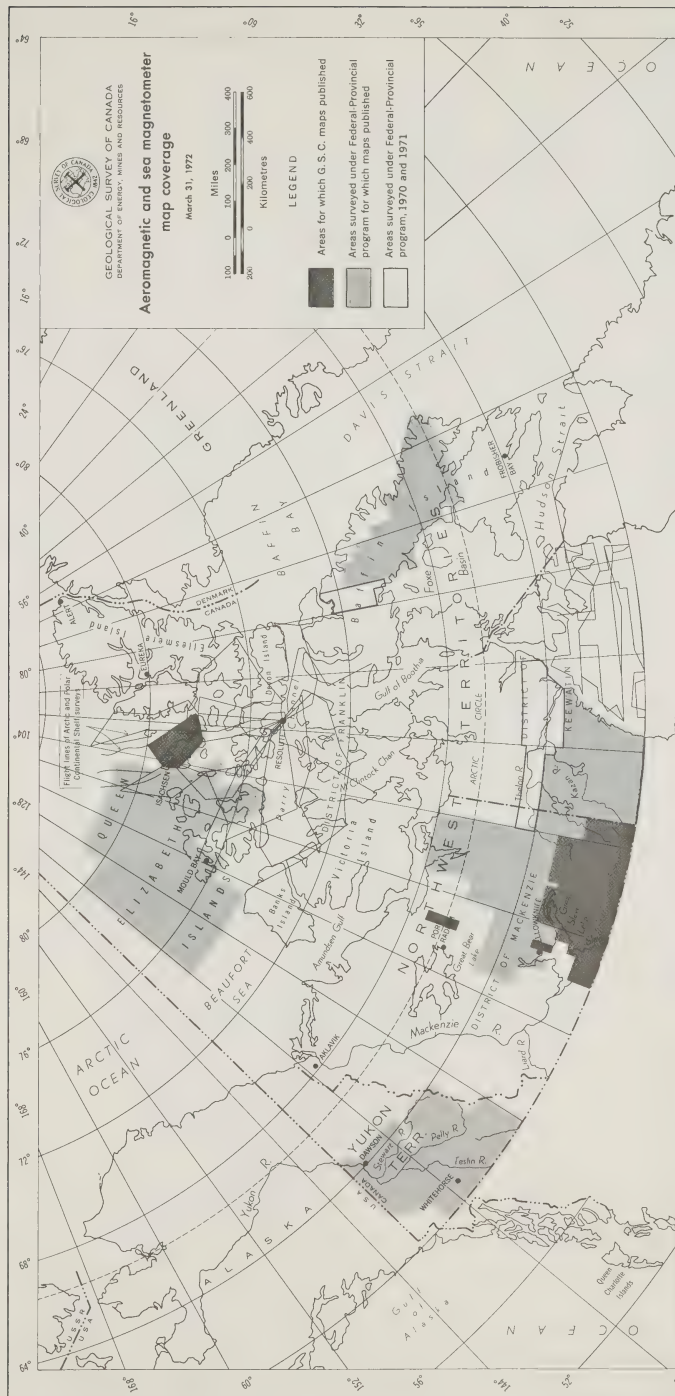
Preliminary drafts of surficial geology photomosaic map of District of Mackenzie (NTS 95A, 85E, 95J and 95H); compiled by N. W. Rutter, Miss G.V. Minning and J. Nettekville.

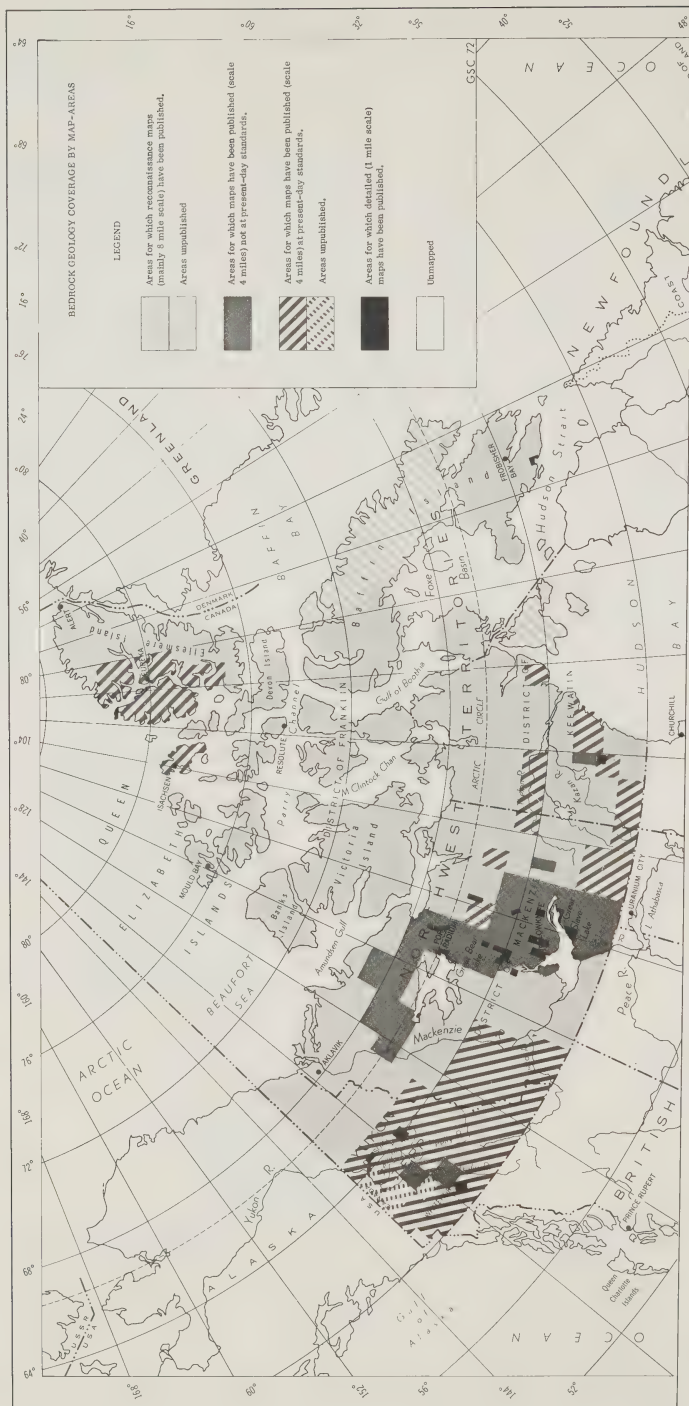
Open file 94

List of published measurements of lithologic sections in the Canadian Arctic Islands

	index map showing number of section and location; compiled by K. J. Roy.	Geology by J. W. Kerr and R. L. Christie.	Wells), 96F (Mahony Lake) and 96G (Fort Franklin); compilation by R. L. Monroe
Open file 96	Preliminary drafts of surficial geology and landform maps of Malloch Hill (NTS 97F), Mackenzie Delta (NTS 107C), Stanton (NTS 107D) and Cape Dalhousie (NTS 107E); V. N. Rampton	Open file 107 Samples of fossils, suites of petrographic thin sections and analytical reports from wells drilled in the Districts of Mackenzie and Franklin and the Yukon Territory that are in the custody of the Institute of Sedimentary and Petroleum Geology in Calgary.	Preliminary Geological Maps
Open file 97	Unedited drafts of three surficial geology maps with legend of part of the Mackenzie Valley, NWT, comprising NTS numbers 106I, 106M and 106N; scale 1:125,000. Compilations interpreted from aerial photographs and supplemented from field data collected during 1971 by O. L. Hughes, D. A. Hodgson and J. Pilon.	Open file 108 Unedited drafts of three surficial geology maps with legend of part of the Mackenzie Valley, NWT, comprising Ontaratue River (NTS 106J), Martin House (NTS 106K) and Travaillant Lake (NTS 106O) at a scale of 1:1,125,000. Compilations are interpreted from aerial photographs and supplemented from field data collected during 1971 by O. L. Hughes, D. A. Hodgson and J. Pilon.	Map 5-1971 Geology of Norman and Camsell River, District of Mackenzie. Scale: 1:500,000; H. R. Balkwill
Open file 99	Flight logs and index maps of aerial photographs. Photography carried out in Fort Smith and Yellowknife districts of Northwest Territories.	Open file 115 Unedited lithologic descriptions of thirty-three measured sections of Carboniferous and Permian strata, northern Yukon Territory; E. W. Bamber	Multicolour Geological Maps, A Series
Open file 100	Flight logs and index maps of aerial photographs. Flights were within the area covered by sheets NTS 85I, Hearne Lake, and NTS 85J, Yellowknife, Northwest Territories.	Open file 119 Preliminary draft of a surficial geology and landform map of Aklavik (107B E 1/2); V. N. Rampton	Map 1298 A Geology of Slidre Fiord, District of Franklin. Scale: 1:50,000; compilation by R. Thorsteinsson
Open file 101	Radioactivity maps and profiles from the G.S.C. gamma-ray spectrometer system relating to an area east and northeast of Fort Smith, Northwest Territories, approximately 71 miles by 185 miles, covering NTS map sheets 75D and 75E, and extending south into sheets 74M.	Open file 120 Preliminary drafts of Terrain Classification and Sensitivity Maps of Demarcation Point (117C), Herschel Island (117D), Blow River (117A), and Aklavik west half (107B); compilation by R. L. Monroe	Map 1299 A Middle Fiord (Geology), District of Franklin, 1971. Lat. 79-00 to 80-00; Long. 92-00 to 96-00. Sheet 59G. Scale: 1:250,000; compilation by R. Thorsteinsson.
Open file 102	Tectonic styles of northern Yukon Territory and northwestern District of Mackenzie; D. K. Norris	Open file 121 Preliminary drafts of Terrain Classification and Sensitivity Maps of Fort McPherson (106M), Arctic Red River (106N), Travaillant Lake (106O), Martin House (106K), Ontaratue River (106J) and Fort Good Hope (106I); compilation by R. L. Monroe	Map 1300 A Eureka Sound (Geology), District of Franklin, 1972. Lat. 78-00 to 79-00; Long. 84-00 to 88-00. Sheet 49F. Scale: 1:250,000; compilation by R. Thorsteinsson.
Open file 106	Unedited drafts of geological maps with legends of Sawyer Bay (39G), Dobbin Bay (39H and 29G) and Kennedy Channel-Lady Franklin Bay (120B and 120C); all parts of the Canadian Archipelago.	Open file 125 Preliminary drafts of Terrain Classification and Sensitivity Maps of NTS 96B (Blackwater Lake), 96E (Norman	Map 1301 A Strand Fiord (Geology), District of Franklin, 1971. Lat. 79-00 to 80-00; Long. 88-00 to 92-00. Sheet 59H. Scale: 1:250,000; compilation by R. Thorsteinsson.
			Map 1302 A Geology of Eureka Sound North, District of Franklin. Scale: 1:250,000; compilation by R. Thorsteinsson.
			Map 1303 A Haig-Thomas Island (Geology), District of Franklin, 1971. Lat. 78-00 to 79-00; Long. 92-00 to 96-00. Sheet 59F. Scale: 1:250,000; compilation by R. Thorsteinsson.
			Map 1304 A Glacier Fiord (Geology), District of Franklin, 1972. Lat. 78-00 to 79-00; Long. 88-00 to 92-00. Sheet 59E. Scale: 1:250,000; compilation by R. Thorsteinsson.
			Map 1305 A Geology of Cape Stallworthy, District of Franklin. Scale: 1:250,000; compilation by R. Thorsteinsson and H. P. Trettin.

- Map 1306 A Geology of Tanquary Fiord, District of Franklin. Scale: 1:250,000; compilation by R. Thorsteinsson and H. P. Trettin.
- Map 1307 A Strathcona Fiord (Geology), District of Franklin, 1972. Lat. 78-00 to 79-00; Long. 80-00 to 84-00. Sheet 49E. Scale: 1:250,000; compilation by R. Thorsteinsson.
- Map 1309 A Geology of Otto Fiord, District of Franklin. Scale: 1:250,000; compilation by R. Thorsteinsson and H. P. Trettin.
- Map 1310 A Geology Bukken Fiord, District of Franklin. Scale: 1:250,000; compilation by R. Thorsteinsson and H. P. Trettin.
- Map 1312 A Baumann Fiord (Geology), District of Franklin, 1971. Lat. 79-00 to 80-00. Sheet 49C. Scale: 1:250,000; compilation by J. Wm. Kerr and R. Thorsteinsson.







MINERAL RESOURCES BRANCH

Responsibilities

The Mineral Resources Branch collaborates with the Department of Indian Affairs and Northern Development and other departments and agencies in formulating policy, and planning and evaluating projects with respect to mineral resource and economic development in northern Canada. The aim of the branch is to realize optimum economic and social benefits for Canadians by effectively managing mineral resources as both a commodity and an industry, and by doing so in a regional, national and international context.

The branch administers the Emergency Gold Mining Assistance Act and advises and makes recommendations on matters of mineral taxation to the Department of Finance and the Department of National Revenue.

Long-term Plans

The branch will continue to advise on, participate in, and undertake programs and activities that are related, wholly or in part, to mineral exploration, development, exploitation and utilization, and northern economic development.

Review of 1972 Operations

The Mineral Resources Branch continued to advise the Department of Indian Affairs and Northern Development and to participate in interdepartmental activities concerned with economic development in the North. Comments and suggestions on the problem of the two unresolved Northern Indian Treaties were forwarded to Indian Affairs and Northern Development through the deputy minister. Opinions on the mineral resource potential of three proposed new national parks (now completed) in the two Territories were also forwarded to Indian Affairs and Northern Development.

As a member of the Interdepartmental Advisory Committee on Northern Roads, the Interdepartmental Committee on Pacific Coast Transportation, and the Administrative Group on Northern Roads and Airstrips, the branch was involved in various economic mineral assessments. Many of these appraisals were related to the 10-year, \$100 million northern roads program implemented in 1965.

In 1972 an appraisal was made of the mineral potential which could be reached by ancillary roads through the Mackenzie River valley from the Mackenzie Highway.

Considerable time was devoted to attending meetings of the EOS Working Group of the Advisory Committee on Northern Development, to preparing reports on the meetings, and to providing mineral information to the group. The group was developed as an interdepartmental organization to consider a proposal by a West German ship-building firm that Canada supply the firm with scientific data on ice and shipping conditions in the Arctic.

The branch, through the deputy minister, continued to assist the organizers and planners of the Sixth National Northern Development Conference, scheduled to be held in Edmonton in November 1973.

The branch is a member of the Inter-governmental Committee on Northern Development, Canadian Council of Resource and Environmental Ministers which studies ways in which Canada's North can be used. With a view to producing a philosophy for development of the North, the committee plans to be represented at the council's 1973 Conference on Man and Resources.

The department's responsibility for national energy policies requires special attention to petroleum and natural gas developments in the Arctic, and involves the branch in departmental and interdepartmental task forces.

The branch administers the Emergency Gold Mining Assistance Act, introduced in 1948 to provide financial assistance to marginal gold mines. The provisions of the Act are due to expire 30 June 1973, although indications are legislation will be introduced to extend it. In 1972 field inspections were made of placer-gold and lode-gold operations carried on during 1971 in the Territories. During 1972 about \$1,536,000 was paid to the five lode-gold mines in the Northwest Territories based on 1971 operations; this amount is 90 per cent of the total actually payable. On 1971 operations about \$14,000 is payable to nine placer operators in the Yukon. Due to the higher prices available on world markets, Canadian gold producers have not been selling to the Royal Canadian Mint during 1972. As a consequence, no

payments have been made under the Emergency Gold Mining Assistance Act on 1972 production.

The branch provides technical advice and recommendations to the Department of National Revenue on taxation matters relating to the mineral industry (three-year tax exemption, depreciation, depletion, etc.) under the Income Tax Act. Field investigations are often made for this purpose. The benefits accorded to the mineral industry are, of course, also applicable to mining operations in the North. When applications are received from such concerns they are assessed on an individual basis.

During 1972 the National Mineral Inventory kept inventory of new discoveries in the North and developments of mineral occurrences. This information is made available to the Department of Indian Affairs and Northern Development in Ottawa and to resident geologists at Whitehorse and Yellowknife.

Plans for 1973

As an advisor to such other departments as Indian Affairs and Northern Development, Finance, National Revenue, and the Ministry of Transport, and as a participant in related task forces and interdepartmental committees, the Mineral Resources Branch expects to continue mineral economic studies and to recommend policy concerning northern development. The branch will continue to provide subsidies under the Emergency Gold Mining Assistance Act, although these are expected to be at reduced levels due to conditions in world gold markets.

The branch anticipates participation in special studies on national mineral and national energy policies, both of which affect the North, and on transportation activities along the Mackenzie Valley and in the Arctic. Assistance, as requested, will continue to be provided to the organizers of the Sixth National Northern Development Conference and to the Conference on Man and Resources.

Officers of the branch will continue to participate in seminars and conferences on the economics of mineral exploitation in the North, and will carry out the necessary field investigations and inspections.

ES BRANCH

Responsibilities

Technical and consulting assistance in northern mining, mineral processing, metallurgical, natural gas, petroleum, and coal developments.

Long-term Plans

To continue its role of providing technical and consultative assistance and co-ordinating with the mining and energy industries, the Department of Indian Affairs and Northern Development, and government agencies.

Review of 1972 Operations

Mineral Processing

The Construction Materials Section has completed preliminary studies of the behaviour of concrete under winter conditions in northern Canada. The initial work was on the strength of concrete at temperatures down to minus 30°F. Strengths at temperatures down to minus 100°F will be determined.

Pyrometallurgical Metallurgy

Various research and development projects were undertaken in non-ferrous pyrometallurgy in the areas of ore processing, corrosion prevention, and mine effluent treatment. The aim of the program was to improve the extractions of base and precious metals and to assist Canadian mills in the disposal of liquid wastes in accordance with environmental specifications. Work on recovering copper, nickel, and zinc from acid drainage waters by ion exchange could be applied to mines in the Yukon Territory and the Northwest Territories.

Methods were being developed for reducing the corrosion of steel during wet grinding and mineral flotation.

Improved instrument techniques were developed for the analyses of ores, concentrates, and related products. Studies included establishing lower limits of analyzing copper, zinc, and iron, and other elements not normally found in ores, particularly in concentrates concerning the water environment. In addition to visual detection a method has been developed to trace, with a greater degree of confidence, small amounts of elements in metallurgical operations. The

Canadian Mineral Analysts (sponsored by the division) held their fourth annual meeting, distributing the proceedings and the first installment of "The Methods Manual for the Canadian Mining Industry — Part I" to delegates from the Yukon, the Northwest Territories, and other parts of Canada.

The Canadian Mineral Processors (sponsored by the division) held their fourth annual meeting, a symposium on grinding, cost estimating, ore drying, and mine waste control. Metallurgists and mill superintendents of major Canadian producers, including those from the northern territories, received copies of the proceedings.

Technical information on ore processing and environmental control was dispensed to the mining industry. This included an assessment of a new pollution-free hydrometallurgical process, for base metal concentration in the Yukon, prepared for the Department of Indian Affairs and Northern Development.

Mineral Sciences

The Analytical Chemistry Section analyzed sixteen line-pipe steels, five maraging steels, and several weathering steels, involving approximately five hundred determinations of at least twelve different elements.

The technician in charge of the assay office (Indian Affairs and Northern Development) at Yellowknife received instruction on the assaying of gold and silver from the Fire Assay Group of the Analytical Chemistry Section.

Fuels Research

As part of the continuing mine safety program in the North, three mine air samples were analyzed for United Keno Hill Mines Limited at Elsa, Yukon.

To aid environmental control authorities in the North, research was continued on the development of analytical methods to characterize oil spills and to more positively identify oils. By indicating the level of maturation of oil, an important factor in oil exploration, these methods of analysis also show promise as an aid to geologists.

To provide a basis for extrapolation to Arctic conditions, plume dispersion research at McMurray, Alberta, was continued. This will be necessary until a suitable smoke stack, with the necessary heat flux and

height, becomes available for detailed study under arctic conditions.

Mining Research

A survey of mining problems in the North was completed during the year. The survey pointed up areas of research which may promote northern mineral production. Supported by a departmental grant of \$5,000, the centre monitored university research on permafrost. The research involved standard laboratory tests on rocks from a permafrost area, while in their frozen state, and after they had been thawed.

All of the centre's work in rock mechanics, slope stability, and mine environment is applicable to northern mining.

Metal Reduction and Energy

The Centre is concerned with such problems as:

- removing clay from the effluent of processed tar sands;
- pyrometallurgical extraction of metals from the ash from tar sands bitumen; and
- reduction of Baffin iron ore with coal from Ellesmere.

The centre's facilities and activities in evaluation, beneficiation, carbonization, delivery of coal and coke, and pyrometallurgy are all applicable to problems that can be expected in the Arctic.

Physical Metallurgy

Activities supporting northern development were co-ordinated through two major projects, one of a general nature and the other more specific. The former covers various aspects of metals and alloys; the latter deals with oil and gas pipelines.

Metals and Alloys for Use in the Arctic

The critical survey of the engineering characteristics of ferrous and non-ferrous alloys for service at temperatures down to -100°F has continued. Individual sections on ferrous, aluminum, titanium, zinc, copper, tin and lead alloys have been prepared for the proposed monograph, which is intended to provide guidance and reliable technical data for the design of structures, vehicles, and equipment for the North.

Toughness of steel is most adversely affected by low temperatures. Results indicate that a variety of heat treatments and variations in composition can cause segregation or precipitation of alloying elements in such a way that the prior-austenitic grain boundaries seem to become sites for the easy nucleation of cracks and, in some cases, paths of easy crack propagation. Under these conditions the toughness of the steels is poor, but can be improved by heat treatment.

Sulphide inclusions decrease toughness, but encouraging results have been obtained in experiments to control both number of inclusions, and their shape, by de-sulphurization and by the addition of rare-earth metals and their silicides.

The study of the effects of forming on three high-strength low-alloy steels and a carbon structural steel has shown that forming induces strain-ageing embrittlement at low temperatures.

In connection with the use of low-maintenance steel structures, the effects of the galvanizing process, especially hydrogen embrittlement, have been studied. Special consideration has been given to heavy-section steel that must be welded. Investigations to date have indicated that, under static loading, cracking due to hydrogen embrittlement will not result from normal processing and service.

Research on resistance to environmental cracking of selected high-strength steels is continuing; essentially in a simulated marine environment. Tests on pre-cracked specimens of 18 percent Ni (200) maraging steel showed little effect of crack orientation, but the rate of propagation was higher than for Inconel 718 alloy. Other tests to determine the influence of dissolved oxygen showed little effect under free-corrosion conditions. At the potential of cadmium, however, environmental cracking was much more severe in the de-aerated solutions.

The notch ductility of welds made by various processes in a standard grade of structural steel plate is being examined. Good-quality electrogas welds were produced by using a flux-cored wire and were found to have unexpectedly high notch ductility at temperatures as low as -120°F .

Metals and Alloys for Fuel Transmission Pipelines

The aim of this project to ensure the structural integrity of pipelines so as to

minimize pollution and to maintain operational efficiency. Two approaches are being followed, one involving the assessment of Canadian- and foreign- manufactured pipe and the other, the development of a weldable line-pipe steel of improved strength and toughness.

Some lengths of pipe, 36 inches to 48 inches in diameter, longitudinal- and spiral-weld, have been expanded hydraulically; others have been expanded mechanically. The evaluation procedure involves non-destructive inspection, both radiographic and ultrasonic, measurement of residual stresses induced by fabrication, determination of the mechanical properties and their variability in both the parent metal and the seam weld, and special studies of the fracture toughness, the weldability under field conditions, the resistance to environmental cracking, and the effects of low-cycle fatigue.

The standard specification tests for the toughness of line-pipe steels are the Charpy impact test and the Drop-Weight Tear Test (DWTT). The former is based on an energy absorbed value at a specific temperature and the latter on a fracture appearance rating. Direct measurement of the dynamic toughness using instrumented large-scale specimens has shown that the correlation of Charpy energy with crack propagation resistance could vary by a factor of 4 from one steel to another. Similarly, it was found that the DWTT appearance rating could be the same for steels whose ductility differed by a factor of 10. A 5,000-to 10,000-ft lb, pendulum impact machine was therefore constructed to measure the energy absorbed in the fracture of large-scale full-thickness specimens cut from the line pipe. Results to date indicate little sensitivity to the geometrical parameters, and it is expected that the test will show better correlation with service performance.

Two methods must be considered for the field welding of northern pipelines — automatic welding and manual welding with either low-hydrogen or cellulosic electrodes. Sample field welds made using two different automatic processes were sound and had good notch ductility. Manual welds made with low-hydrogen electrodes also had good notch ductility, but these electrodes had very poor handling characteristics compared with cellulosic electrodes for the circumferential downhill welding of pipe. Weldability

tests have shown that several pipeline steels will be susceptible to heat-affected-zone cracking in manual welds made with cellulosic electrodes with a low energy input. Heating may be necessary to prevent cracking in field welding.

A review of the literature indicated that hydrogen sulphide was the most active agent in inducing environmental cracking in line pipe. U-bend specimens, cut from the pipe with the seam weld at the centre, were immersed in a solution saturated with hydrogen sulphide. A significant difference in the behaviour of the various candidate materials was apparent. Tests on pre-cracked cantilever specimens, designed to give a more quantitative result, are in progress.

Initial results of the study of the role of low-cycle fatigue in line-pipe steel fracture showed that crack propagation rates at arctic temperatures are the same as at room temperature. Specimens cycled to failure under constant maximum load always gave high strength values than specimens fatigue-cracked to the same depth and monotonically loaded to failure. The indications are, therefore, that low-cycle fatigue is not a serious failure hazard in undamaged pipe.

Work on the effect of thermomechanical processing on the strength and toughness of selected structural-steels was continued. Several slabs were rolled from different initial temperatures, either continuously with intermediate spray quenching to the finishing temperature. The percentage reduction in the two stages and the final cooling rate were varied. Data obtained from this study should facilitate the improvement of existing line-pipe steels.

Plans for 1973

Research will continue on the strength of concrete at low temperatures, on extract metallurgy and control of effluent pollution on characterizing oils to aid in environmental control and to aid geologists, and on extrapolating plume dispersion data to northern conditions.

Preparation of a monograph on metals and alloys for arctic service will continue and a standard structural steel will be tested for corrosion in both air and sea water in the Arctic. Mechanically damaged pipe will be subjected to cyclic pressurization tests to determine the critical fracture conditions that would cause a brittle crack to propagate through ductile metal.

POLAR CONTINENTAL SHELF PROJECT (PCSP)

Responsibilities

to do a long-term study of the continental shelf lying north of the mainland of Canada and north and west of the Canadian Arctic archipelago, including the sea floor, the earth's crust, the mantle beneath it, and the waters above it; together with the islands of the archipelago, the straits and sounds between the island and, where relevant, the continent mainland. The study covers mainly the fields of survey and research for which the Department of Energy, Mines and Resources is responsible in other parts of Canada, wherever such study is not more economically and efficiently pursued as a separate self-contained operation. It is also intended to include or to support worthwhile research in fields outside those normally covered by the department if such research is in the national interest and could otherwise be done. An important function of the PCSP is to co-ordinate and arrange for mutual or concerted action by the various agencies whose diverse specialities or capabilities can be brought to bear on difficult but related aspects of a major Arctic theme or critical area of study; and to provide continuity of planning and operation for various studies whose separate activities are short term and focussed on individual problems. Emphasis is placed on field research and survey, but basic laboratory or analytical research is carried out as needed either in the investigations, or in the interpretation of field data; and equipment or techniques for unique development or experimentation are undertaken as relevant. In addition, the facilities of the project are made available under certain conditions, to approved university and other non-government research groups.

Field Plans

Field surveys and research will eventually cover all the Canadian sector of the Arctic continental shelf of North America, those parts of the Arctic Ocean basin that are of interest to Canada, and those parts of the Arctic Archipelago and Arctic mainland not investigated by other agencies in the fields of interest to the Department of Energy, Mines and Resources. It is intended that the project co-ordinating and logistics support functions of the project shall be made available wherever appropriate and approved, to facilitate activities of interest to the government of Canada in any part of Arctic Canada and adjacent oceans.

Review of 1972 Operations

Major field work was done from mid-February to early October and was co-ordinated mainly from Tuktoyaktuk in the Mackenzie River Delta area and from Resolute on Cornwallis Island.

The Arctic Ice Dynamics Joint Experiment (AIDJEX) camp was established on the Beaufort Sea about 400 kilometres north of Barrow, Alaska, again involving some twenty research investigations and 60 scientists and technicians. A highlight of the field season was a visit to the AIDJEX camp by three Russian scientists. The other major field program was the regional hydrographic and gravity surveys conducted in the eastern Beaufort Sea. Other studies ranged from the Richardson Mountains in northern Yukon to Baffin Island to Lincoln Sea northeast of Ellesmere Island. A total of 63 diverse projects were supported by the Polar Continental Shelf Project in 1972.

In addition to the Department of Energy, Mines and Resources, the following agencies were involved in or received assistance from the 1972 program of the Polar Continental Shelf Project:

Department of the Environment
Department of Indian Affairs and Northern Development
Department of National Defence
National Museums of Canada
National Research Council — Canadian Committee for the International Biological Program
Quebec Department of Tourism, Fish and Game
AIDJEX Steering Committee (Canada and USA)
Arctic Institute of North America
University of Alberta
University of British Columbia
Brock University
University of Calgary
Hokkaido University
McGill University
Memorial University of Newfoundland
Swiss Federal Institute of Technology
University of Ottawa
University of Toronto
University of Colorado, Institute of Arctic and Alpine Studies
University of Massachusetts
Michigan State University
University of Tubingen
U.S. Army Cold Regions Research and Engineering Laboratory
U.S. National Science Foundation

The following is a summary of work done in the major scientific fields in 1972 by the Polar Continental Shelf Project, or to which the Project contributed. In several cases, as noted, the project provided logistics or field support to studies of other agencies; these studies are described in more detail in the reports by the respective agencies responsible for their scientific direction.

● *Archaeology: Independence I, Dundas Island & Grinnell Peninsula*

Investigator: R. McGhee, Memorial University of Newfoundland

The field crew was supported and moved from Resolute to Dundas Island to Refuge Bay on Grinnell Peninsula by the Polar Continental Shelf Project. From an investigation of several sites on Refuge Bay, the dating of an Independence I occupation is uncertain other than to say that the elevation of the ruins at 22 to 24m. above sea level is consistent with a date of around 2,000 B.C. A Pre-Dorset occupation post-Independence I has also been found at Refuge Bay. Artifacts found at an elevation of 12 to 14m. above sea level have been identified with Independence II occupation. Late Dorset occupation has been recognized on Dundas Island.

● *Biology: General Arctic Ecology, eastern Arctic Archipelago*

Investigator: R.D. Muir, Canadian Wildlife Service

An airborne terrain analysis system was developed and field tested, with parallel tests being conducted to determine the resolution limits of photographic methods. False colour infra-red tests were also conducted. The distribution of game animals and apparent range quality was noted on several islands. Several drill sites, exploration camps and potential pipeline routes were visited.

● *Biology: Ethology; Animal Community Study, Bathurst Island*

Investigator: S.D. MacDonald, National Museum of Natural Sciences

This research program, concerned with communities and densities of species, and factors affecting them, requires continuous records of phenological events during the daylight period. A ten-year period is considered a minimum length of time for interspecific relationships, adaptations to population fluctuations of prey species and the weather conditions affecting them to become apparent. Principal

studies in 1972, supported by the Polar Continental Shelf Project, were concerned with ptarmigan, ivory gulls, lemmings shore birds and sedge meadows.

● *Biology: Ichthyology, Western Arctic*

Investigators: D.E. McAllister and D. Russell, National Museum of Natural Sciences

Sixteen species and 157 specimens of freshwater and marine fishes were collected from 15 stations with the logistical support of the Polar Continental Shelf Project. Specimens of pond smelt, (*Hypomesus olidus*), are the first from brackish water in the Arctic. The known ranges of the Arctic char on Banks Island have been extended. Other specimens of fish and algae collected are the first to be reported from various Western Arctic locations.

● *Biology: International Biological Program: Tundra Ecosystem Study, Truelove Lowland, Devon Island*

Investigator: L.C. Bliss, University of Alberta for Canadian Committee for the I.B.P. (N.R.C.)

The third field season study of a High Arctic ecosystem included 24 separate studies dealing with permafrost, soils, meteorology, hydrology, plant and animal production, photosynthesis, nitrogen fixation, decomposition, land surface perturbations, and systems analysis. An overwintering party of six is studying muskox, meteorology, and permafrost temperature regime. Polar Continental Shelf Project provided logistic support from Resolute Bay, and various camp equipment and supplies.

● *Biology: Ecological and Vegetation Studies, Devon Island*

Investigator: K. de la Barre, Arctic Institute of North America

Complete systems of rhizome growth were examined. Six sedge meadows on Bathurst Island were selected and analyzed for comparison with Devon Island meadows. Natural revegetation over heavily disturbed sites will be monitored in subsequent seasons. The influence of environmental conditions over two extensive but adjacent sites differing in elevation by 300m. will be thoroughly investigated. Polar Continental Shelf Project and other federal agencies have contributed substantially to this study.

● *Biology: marine, Beluga whales, Mackenzie Delta*

Investigators: D.E. Sergeant and W. Hock, Fisheries Research Board of Canada

Aerial surveys were carried out in the Mackenzie Delta region in Polar Continental Shelf Project aircraft. In the early summer about 2,000 white whales were seen in the western delta while in the autumn about the same number were seen in one herd northwest of Herschel Island. This is a reasonable census of the area. In view of the large estuarine calving area and late summer feeding area available to Mackenzie area white whales, it is theorized that the white whale is forced to migrate along the north Alaskan coast to winter in areas of more open, or at least mobile, ice; the necessity for long migrations limit their numbers in comparison with western Hudson Bay and Lancaster Sound areas.

● *Biology: marine plankton, Bathurst Island*

Investigator: C.T. Shih, National Museum of Natural Sciences

In a program supported logistically by Polar Continental Shelf Project, thirty samples of freshwater planktonic crustaceans were collected from a large lake and from small ponds and marshes. Anostracan larvae are dominant in the centre open area, while cyclopoid and harpacticoid copepods are abundant in the coastal area of the large lake. In the small ponds and marshes, two species of copepods dominated the samples.

● *Biology: marine, planktonic foraminifera, Beaufort Sea*

Investigator: G. Vilks, Atlantic Geoscience Centre, Bedford Institute, E.M.R. During March and April 1972, plankton tows, bottom sediment samples and oceanographic bottle casts were taken in the Beaufort Sea at 36 locations reached by helicopter under logistical support from Polar Continental Shelf Project base camps. There is a horizontal distribution of surface salinities varying between 30°/00 and 31°/00. Winter population of planktonic foraminifera in the Beaufort Sea is much reduced in comparison to summer population suggesting that the cover of ice and snow of the Arctic Ocean is a greater deterrent to planktonic foraminifera than to other zooplankton. A layer of sediment relatively rich in planktonic forams, therefore, may represent a period of relatively warmer paleoclimates

with less extensive ice cover in the Arctic Basin.

● *Biology: zoology, polar bear research, Western Arctic*

Investigator: I. Stirling, Canadian Wildlife Service

Ninety-seven bears have been tagged to date, four of them recovered by Eskimo hunters in Canada and Alaska. Field work in 1972, supported by Polar Continental Shelf Project, undertook to tag bears, look for recoveries, collect specimens of bears and seals from Eskimo hunters, collect specimens from seals killed by bears and record the effects of ice conditions on the movements and distribution of bears and seals.

● *Biology: zoology, Greater Snow Goose, Eastern Canadian Arctic*

Investigator: J. D. Heyland, Quebec Wildlife Service

The traditional movements of the Greater Snow Goose population may have been altered in 1972 due to abnormally severe weather. Several anomalies were noted: birds banded in previous years were found in widely spread areas, causing discussion as to the fidelity of geese to their natal and moulting areas and the interchanging of birds between various sub-populations. One bird banded as a gosling in 1957 on Bylot Island was recaptured in 1972 in the Eureka areas; it has survived 14 hatching seasons. Vertical aerial photography has facilitated a census of greater and lesser snow geese. Rotary and fixed wing aircraft and camera facilities have been provided by the Polar Continental Shelf Project.

● *Biology: vertebrate paleontology, Western Arctic Archipelago*

Investigator: D. A. Russell, National Museum of Natural Sciences

Fossil vertebrate material of late Cretaceous age, collected from four localities in shallow marine sediments at Horton River, Banks Island, Thomsen River and southern Eglinton Island, represents the northern most occurrence of Cretaceous vertebrates in the world. The presence of large reptiles at latitude 74°N indicates that this region was subtropical immediately before the extinctions which took place at the end of the Mesozoic era. No trace of vertebrate fossils was found in Cretaceous rocks on northern Eglinton Island, northern Banks Island and Prin-

trick Island. Helicopter and logistical support was supplied by Polar Continental Shelf Project.

Geology: *Glacial*, Archer Fiord/Lady Franklin Bay northeastern Ellesmere and

Investigator: J. H. England, Institute of Arctic and Alpine Research

data imply that late Wisconsin glaciation is neither vertically nor horizontally as extensive as earlier Wisconsin events in the study area. A relatively major post-glacial rebound of 340 feet occurs at Ida Bay, probably due to changing crustal conditions and the late Wisconsin ice load. Logistical support was provided by Polar Continental Shelf Project.

Geology: *sedimentation*, Yukon coastal plain

Investigators: B. C. McDonald and C. P. Lewis, Geological Survey of Canada, E.M.R.

The modern sedimentary environments of the coast and rivers from the Mackenzie delta to the Alaska boundary have been studied, focusing on the types, magnitudes and frequencies of erosional and depositional processes presently active in the area with the purpose of assessing their potential impact on various human activities. Field work, supported by Polar Continental Shelf Project, was concentrated on five major rivers and the coast. In the rivers the emphasis was on the description of channel patterns and permanent features. The coast can be subdivided into major sources and sinks of sediment with intervening areas of near equilibrium. Longshore currents transport most of the sediment toward these sinks.

Geology: *Stratigraphy*, Somerset Island
Investigators: O.A. Dixon and B. Jones, University of Ottawa

Detailed measurement of stratigraphic sections in the Read Bay Formation (Paleozoic) was completed in 1971 and 1972 supported by Polar Continental Shelf Project. Work is proceeding on the petrology of the sediment samples and on relating the fossil faunas to the different sedimentary facies represented. There appear to be general east-to-west facies changes representing gradual increased water depths in the depositional environments.

Geology: *Quaternary*, Melville Island

Investigators: D. M. Barnett and D. L.

Forbes, Geological Survey of Canada, E.M.R.

A general equilibrium of geomorphic processes appears to be rapidly establishing itself in areas no longer subject to vehicle movement. At Sherard Bay the highest and most poorly vegetated site is actively gullying, while vegetation is re-establishing itself at Sherard Bay and Drake Point even where the ground was churned. Low-level vertical photography was flown in 1972 between these two areas. Over 100 holes to a depth of one metre were drilled in various sedimentary formations ranging from weathered Paleozoic to Quaternary in age. From these cores moisture content, among other elements, was determined. Polar Continental Shelf Project supplied minor support.

- **Geology:** *Surficial*, central Ellesmere Island

Investigator: D.A. Hodgson, Geological Survey of Canada, E.M.R.

The effects of construction and vehicle operation on a variety of terrain types indicate that roads and airstrips are visually prominent and induce vegetation changes such that merger with the surrounding landscape is unlikely. Maps of surficial materials and landforms as a basis for land-use planning and regulation will be completed after the 1973 field season. Limited Polar Continental Shelf Project Support permitted some subsurface information to be acquired; many of the polygonal trenches are underlain by substantial ice wedges. Considerable ice has been detected in the upper two metres of most frozen fine-grained materials.

- **Geology:** *Tertiary*, western Arctic Islands

Investigators: L.V. Hills, University of Calgary and J.V. Matthews & J.G. Fyles, Geological Survey of Canada, E.M.R.

The type locality for the Beaufort Formation of Late Tertiary age is near Landing Lake on Prince Patrick Island while the best exposures are on southwestern and northwestern Banks Island. On northwestern Banks Island, the formation can be subdivided into two or possibly three lithologic units subdivided by erosional unconformities. Paleocurrent data indicate a general east-west trend on Banks Island and to the north on Ellef Ringnes Island. The Beaufort Formation was probably deposited prior to the development of the straits between the islands.

Logistical support was provided by Polar Continental Shelf Project.

- **Geology:** *Surficial*, Yukon Coastal Plain
Investigator: V.N. Rampton, Geological Survey of Canada, E.M.R.

Surficial mapping to upgrade previous work was carried out for publication on a scale of 1:125,000 as far south as the British Mountains and the northern Richardson Mountains. A special effort was made to characterize the ice content of surficial materials in the valleys and on the coastal plain. Material was collected for C^{14} dating and paleontological studies. This project was given considerable helicopter support from Polar Continental Shelf Project. Studies were also initiated to monitor the movement of materials on slopes by placing markers on typical major morphological slope-type features.

- **Geology and Geophysics:** *Surficial*, Tuktoyaktuk area

Investigators: J.A. Hunter and V.N. Rampton, Geological Survey of Canada and J. Wyder, Geological Survey of Canada, now Kenting Earth Sciences

The potential usefulness of surface resistivity, selected borehole geophysical tools and seismic refraction and reflection techniques to investigate surficial deposits was investigated. A drilling and coring program was undertaken at sites where the geophysical data had been acquired. Logistical support was given by Polar Continental Shelf Project.

- **Geomorphology:** *terrain sensitivity*, Banks Island

Investigator: H.M. French, University of Ottawa

The observation and instrumentation of several areas of rapid fluvial erosion, the observation of ground ice slump features, the investigation of mass wasting processes and the observation and measurement of patterned ground and ice-wedge features were directed at the study of naturally occurring thermokarst processes and ground ice melting. A preliminary analysis of geotechnical and lithological properties of the soils and sediments was undertaken to develop a map of terrain sensitivity for a 30 square mile area. Polar Continental Shelf Project provided total support in the field for this project, while other aspects were funded by National Research Council.

● *Geophysics: Ocean tilt measurements (AIDJEX in part), Beaufort Sea*

Investigator: J.R. Weber, Earth Physics Branch, E.M.R.

Two hydrostatic levels were installed on the Beaufort Sea ice surface during March 1972 to detect the tilt of the ice and the tilt of the fluid surface of the ocean relative to the local equipotential surface. A pressure transducing system with a sensitive differential manometer was also installed to detect ocean tilt in the water below the ice. In addition, a continuously recording gravity meter was installed on the ice to determine the diurnal vertical displacement of the sea surface due to the effect of tide, a complementary measurement to the ocean tilt experiment which measures the non-equilibrium component of the tide. To correct the tilt measurements for speed and horizontal accelerations, a bottom sonar ranging system was employed. Polar Continental Shelf Project supported this experiment with logistics and personnel.

● *Geophysics: Geothermal studies, Arctic Archipelago and Mackenzie Valley*

Investigator: A. Judge, Earth Physics Branch, E.M.R.

Thirty deep boreholes (oil) and 17 shallow boreholes have been instrumented to investigate the thickness and distribution of permafrost and to study its relationship to the terrestrial heat flow from the earth's interior, the surface temperature history and the surface topography. Studies of the shallow permafrost regime of the Mackenzie Valley and of the thermal properties of frozen cores of soils have been conducted in co-operation with Geological Survey of Canada. Polar Continental Shelf has fully supported this research program.

● *Geophysics: Gravity, eastern Beaufort Sea*

Investigator: L. Sobczak, Earth Physics Branch, E.M.R.

A four-mile grid of gravity and bathymetry data was established at 982 stations in the Beaufort Sea, a record production for this area. There is a significant difference between a four and an eight-mile grid of control — all surveys over remote ice-covered areas will be subsequently done with the denser control. The general trend of the gravity anomalies parallels the coastline or cuts it at a shallow angle. Extensive gravity lows are found at the

mouth of the Mackenzie River. Positioning of stations was accomplished by Decca 6f. Polar Continental Shelf Project fully supported this project.

● *Geophysics: Gravity, Victoria Island*

Investigators: B. Hearty and L. Sobczak, Earth Physics Branch, E.M.R.

Inclement weather hindered progress on a regional gravity survey of northern Victoria Island in 1972. The northeastern portion of the island was surveyed from a base camp at Hadley Bay with complete support supplied by Polar Continental Shelf Project. The regional gravity field is relatively flat and featureless. One large anomaly is located along the eastern side of Shaler Mountains.

● *Geophysics: Paleomagnetism, Victoria Island*

Investigators: H.C. Palmer & A. Hayatsu, University of Western Ontario

Natkusiak flows and diabase sills were sampled during 1971 and 1972; 55 samples were obtained from 19 sites. The paleomagnetic data suggest that the Victoria Island basic igneous activity took place during the Franklin Magnetic Interval. Ages calculated from the K—Ar analyses range from 330 to 630 m.y. Redistribution of K and Ar probably took place during an episode of low-grade burial metamorphism. Polar Continental Shelf Project supplied minor support.

● *Geophysics: Remote Sensing, Tuktoyaktuk*

Investigator: R. Iizuka, University of Toronto

Under a contract from the Canada Centre for Remote Sensing a radar system, Holographic Ice Surveying System (HISS), has been designed to measure the thickness of ice. Field trials at Tuktoyaktuk were supported by Polar Continental Shelf Project. The down-looking radar bounces microwaves off the ice, some are reflected from the surface while others penetrate the depth of the ice and are then reflected. By measuring the differences in the two major sets of "ripples" as they return, the thickness of the ice can be determined.

● *Geophysics: marine seismic, Beaufort Sea and environs*

Investigator: J.M. Shearer, Geological Survey of Canada E.M.R.

Continuous seismic reflection work in Eskimo Lakes, Liverpool Bay and the continental shelf of Beaufort Sea reveals the existence of a discontinuous but strong reflector which is believed to be the top of the permafrost layer. The presence of this reflecting horizon beneath the bottom implies a slightly positive temperature regime with the top of the permafrost degrading or melting downward. A pingo-like feature, found off in 1971 from C.H.S. Hudson, has been cored and reveals one metre of solidly frozen sand between two layers of clay. These operations were carried out by M.V. North Star and C.H.S. Parizeau supported by Polar Continental Shelf Project.

● *Geophysics: Seismic, Mackenzie Delta, Yukon coast*

Investigator: J.A. Hunter, Geological Survey of Canada E.M.R.

Shallow seismic refraction profiles were acquired in the Mackenzie Delta to investigate the occurrence of ground ice and near-surface structure in permafrost. A marine refraction experiment to map the lateral and vertical distribution of permafrost was conducted in Mackenzie Bay and Kugmallit Bay. Velocity structure in permafrost in the overburden at selected sites on the Yukon coast was correlated with drill hole information. Velocities in permafrost bedrock and surficial clay and gravels were recorded. This program was supported substantially by Polar Continental Shelf Project.

● *Geophysics: Seismic refraction, Sverdrup Basin*

Investigators: G.D. Hobson and A. Overton, Geological Survey of Canada, A.M. and L. Sobczak, Earth Physics Branch, E.M.R.

A unique co-operative program between six oil companies in industry and three government agencies yielded valuable information pertinent to the sedimentary section and crust of the Sverdrup Basin. Seismic refraction, crustal refraction and gravity data reveal interesting structure within and beneath the Sverdrup Basin. A confidential period of four years for the data precludes publication of the basic data. This project was supported by Polar Continental Shelf Project and co-ordinated by the Geological Survey of Canada with considerable assistance from the Earth Physics Branch, E.M.R.

Glacier Physics: Devon Ice Cap

Investigators: W.S.B. Paterson and R. Berner, Polar Continental Shelf Project

A borehole, 299m deep, was drilled to bedrock in 1972 with complete core recovery. Preliminary oxygen-isotope analyses indicate that the core spans the Wisconsin Glaciation and the Sangamon interglacial with traces of an earlier glaciation at the bottom. Temperatures in the borehole were -23.0°C at 12m and -18.5°C at the bottom, yielding a geothermal heat flux at bottom of $1.5\mu\text{ cal cm}^{-2}\text{ sec}^{-1}$ which is close to the world average. The 1970-71 mass balance of the northwest part of the ice cap was -69 kg m^{-2} while the 1970-71 average is -72 kg m^{-2} . Present accumulation rates suggest that the ice cap may be thickening.

Glaciology: Icebergs, Leffert Glacier, eastern Ellesmere Island

Investigator: G. Holdsworth, Glaciology Div., Inland Waters Directorate, D.O.E.

The 1972 program was multi-purpose. Ground control was provided for aerial photo mapping of the glacier front, the surveying being done in August 1972 for comparison with photography obtained in August 1971. A trilateration-triangulation system was established to measure both horizontal and vertical components of ice flow velocity. Ice thickness was measured using seismic reflection techniques and a radar altimeter (440 mHz). A laser experiment was set up to detect small fluctuations of level in the marginal ice. Tidal records were also kept. Experiments were conducted to determine ice discharge rates at the front and, the subsequent estimate of iceberg productivity, and an examination of the factors contributing to the calving process. Polar Continental Shelf Project provided all air support for this program.

Glaciology: photogrammetry and aerial photography, Arctic Archipelago

Investigator: K. Arnold, Glaciology Div., Inland Waters Directorate, D.O.E.

Approximately 9,900 line miles of photography were acquired from the Twin Otter aircraft of Polar Continental Shelf Project. The program is concentrated upon the determination of mass balance of selected small ice masses to study regional glacier/climate interactions. Weather conditions in 1972 were particularly poor for this type of program.

Glaciology: Climatology, Axel Heiberg Island

Investigators: F. Muller, J. Weiss, K. Schroff, A. Ohmura, A. Iken, McGill University

The mass balance study of the White and Baby Glaciers was continued; since the winter accumulation (1971-72) was slightly greater than usual, the equilibrium line is much lower than in an average year (Weiss). Six automatic weather stations are now operating satisfactorily to record wind speed and direction, and temperature and humidity over the winter period (Schroff). Additional instrumentation in 1972 consisted of pyranometer/pyrradiometer for measurement of the four major components and net radiation. A pyrhelometer determines the quantity of global radiation for calculating change in the albedo of snow with variable solar elevation (Ohmura). The analysis of glacier-movement surveying from previous years has been completed (Iken). Polar Continental Shelf Project provide the logistics for these programs.

Hydrology: Mackenzie River Basin and Arctic Archipelago

Investigator: D.K. MacKay, Glaciology Div., Inland Waters Directorate, D.O.E.

The Polar Continental Shelf Project provided field assistance to various aspects of a comprehensive arctic hydrology program of the Inland Waters Branch of the Department of the Environment. Several of these activities were associated with the studies for the Mackenzie Valley Transportation Corridor, and comprised limnological, hydroclimatological and dendrochronological as well as river flow studies in the Mackenzie River and selected tributaries; another study included hydro-metric measurements on streams in the central archipelago.

Hydrography: eastern Beaufort Sea

Investigator: G.E. Wade, Polar Continental Shelf Project, seconded from Central Region, Canadian Hydrographic Service

The Polar Continental Shelf Project hydrographic unit, in collaboration with the Central Region, Canadian Hydrographic Service, completed reconnaissance bathymetric surveys in the south-eastern Beaufort Sea between Banks Island and longitude 141°W , for charting on a scale of 1:500,000. The survey covered parts of the continental slope with soundings through the ice, and positions controlled

by the Polar Continental Shelf Project Decca 6f Lambda chain based on Hooper Island. The work was done by helicopters out of Tuktoyaktuk and Herschel Island. The work was integrated with regional gravity surveys.

Hydrography: Kennedy Channel

Investigator: G.E. Wade and R.L. Moulton, Polar Continental Shelf Project, seconded from Central Region, Canadian Hydrographic Service

The Polar Continental Shelf Project hydrographic unit, in co-operation with Central Region, Canadian Hydrographic Service, undertook special surveys in Kennedy Channel in co-operation with Danish scientists to determine bathymetry and to locate Hans Island.

Hydrography: eastern Beaufort Sea

Investigator: R.W. Sandilands, Marine Sciences Directorate, D.O.E.

The C.S.S. *Parizeau* carried out a hydrographic survey over 2325 square miles of eastern Beaufort Sea at a scale of 1:100,000. Shoals (121) were examined and 133 bottom samples were obtained. In early September, 1010 miles of seismic profile were run between Mackenzie and Franklin Bays in co-operation with Geological Survey of Canada. Sachs Harbour was resurveyed at a scale of 1:10,000 for navigation purposes. The *Parizeau* navigated in eastern Beaufort Sea using the Polar Continental Shelf Project Decca Lambda survey chain.

Hydrography: Tidal studies, eastern Beaufort Sea

Investigator: S.O. Wigen, Marine Sciences Directorate, D.O.E.

Nine tide recording gauge stations were installed and operated between Pelly Island and Baillie Islands in co-operation with the project immediately above. The gauge records define the rapidly changing tidal characteristics throughout the Liverpool Bay and Eskimo Lakes area. Logistical support was given by Polar Continental Shelf Project to establish these stations.

Oceanography: North Water — Baffin Bay Project, Baffin Bay and Smith Sound

Investigators: J.E. Sater, Arctic Institute of North America and F. Muller, McGill University

The North Water-Baffin Bay Project, started in 1966, is a long-term multi-discipline study of the oceanographic and meteorological conditions and processes in the "North Water" area of northern Baffin Bay. The study was undertaken to increase understanding of the interactions between arctic marine, atmospheric and terrestrial environments. The program includes physical and biological oceanography, meteorology, glaciology, and sea ice studies. Two camps, on Coburg Island and on one of the northwest islands of the Carey Islands, which belong to Denmark, have been occupied through the 1972-73 winter to collect weather and meso-climatic data associated with the area. Regular sea ice observations are made. Two different models have been developed to calculate mass (moisture) and energy exchange in the North Water area. Since the beginning Polar of Continental Shelf Project has supported this project.

• *Oceanography: Under sea ice acoustics*

Investigator: A. R. Milne, Defence Research Board

The Arctic Acoustics Group of DREP/DRB set up field camps in Robeson Channel and Lancaster Sound in the period March to May 1972. The main thrust of the experimental work was to record the sounds of under-ice explosions as they were detonated at various distances and depths. By relating the complex sounds to expected propagation paths, transmission losses can be determined. Other work included measurements of under-ice acoustic reflectivity and the determination of the pressure spectrum of underwater noise caused by wind. The latter observations were backed up by wind-profile observations and methods designed to relate the onset of the saltation of snow crystals to the onset of wind noise. The Polar Continental Shelf Project provided drummed fuels at Resolute and Eureka for a chartered helicopter and provided fuels and a radio watch for the camp in Lancaster Sound.

• *Sea Ice: Dynamics: Wind Stress measurements (AIDJEX in part)*, Beaufort Sea and Robeson Channel

Investigator: E. G. Banke, Bedford Institute, D.O.E.

Polar Continental Shelf Project supported a party of three scientists in the main AIDJEX camp and in a satellite camp to investigate turbulent fluxes of wind,

humidity and temperature over Arctic ice. Similar experiments were conducted in Robeson Channel. Drag co-efficients have been expressed in terms of ice characteristics.

• *Sea Ice: Dynamics: Arctic Ice Dynamics Joint Experiment (AIDJEX)*, Beaufort Sea

Co-ordinator of Canadian activities: E. F. Roots, Polar Continental Shelf Project

AIDJEX is a co-operative multi-discipline investigation of the dynamic behaviour of sea ice, and of the transfer of kinetic and thermal energy between the atmosphere and ocean through a complete or partial ice cover. The objective is to obtain quantitative information, as well as an understanding of the processes involved so that the movement of sea ice, the forces it may exert and the exchange of energy between ocean and atmosphere, under given environmental conditions can be calculated and predicted. Such information and understanding, at present lacking, is necessary for forecasting the movement and variations in behaviour of sea ice, understanding climatic trends, and for planning or designing fixed or moving structures and transport routes associated with resource development in or near the Arctic Ocean. The magnitude and difficulty of the field observational program, and the complexity of the theoretical analysis required, exceed the resources or expertise of any one agency and has led to the present voluntary co-operative exercise between fifteen government and university research bodies in three countries (Canada, U.S.A., Japan).

The major AIDJEX field activities in 1972 comprised a pilot study to develop instruments and techniques for air, water and ice measurements, and to obtain preliminary data to test theoretical concepts prior to a major all-season field experiment presently planned for 1975. The 1972 pilot study was supported by the Polar Continental Shelf Project in the Beaufort Sea approximately 300 kilometers north of Point Barrow.

• *Sea Ice: Dynamics of first year ice*, Mackenzie Delta area

Investigator: P. F. Cooper Jr., contractor to Polar Continental Shelf Project

Data from a strain gauge set out on the ice about two km south of Pauline Cove on Herschel Island indicate the existence of elastic relief in the ice surface. Subsequent

measurements (1972) seem to show plastic flow. Surface wind, temperature and pressure observations were taken on Herschel Island to determine a possible relationship between local weather and movement.

• *Sea Ice: areal surveys*, Arctic Archipelago and Arctic Ocean

Investigator: D. G. Lindsay, contractor to Polar Continental Shelf Project

The Polar Continental Shelf Project completed its twelfth consecutive aerial reconnaissance program of the sea ice conditions in the straits and channels of the Queen Elizabeth Islands and adjacent areas during the period 29 March to 4 November 1972. A total of 376 hours airborne observations were required to complete eight separate surveys of the entire area.

Although the ice conditions observed in the 1972 season were not favourable for marine operations, the results of the aerial observations are good when compared with previous years.

The data are currently being compiled and drafted. The finished maps and texts will be included in a Sea Ice Atlas which will show the ice conditions observed by the Polar Continental Shelf Project from 1961 to 1972 inclusive. The maps and information resulting from the surveys conducted by the Project from 1961 through 1968 are being edited.

Support was also provided for:

- An investigation of the extension of the Alert induction anomaly over the continental shelf beneath the Lincoln Sea
- A survey of wildlife habitat in Queen Maud Gulf area
- Geomorphological studies and ground investigations in the Mackenzie Valley Arctic Coast
- A study of the stratigraphy and sedimentology of the Hadryman rocks of Banks and Victoria Islands
- A study of the glacial geology of Coburg Island
- An investigation of the coastal recession processes in the Mackenzie Delta
- Research on sublittoral marine algae communities
- An aerial survey of Decca 12f positioning system components in Viscount Melville Sound

study of the linguistic history of place names of certain communities and physical features along tributaries of the Mackenzie River

udies to investigate the national park potential of pingos in the Mackenzie Delta

for 1973

The main emphasis on regional and systematic surveys for 1973 will be in Amunduluf and Norwegian Bay. Surveys in geology, gravity and hydrography will be continued. Increased emphasis will be placed on the studies of terrain and the local environment, its behaviour when disturbed, and the potential effects of pipeline and road development on the ecosystem and community life. As the demand for this information grows in response to development trends, special studies on sea ice will be continued.

The base at Tuktoyaktuk will continue to support activity in the Mackenzie Valley and in the Beaufort Sea and in adjacent areas. The hydrographic, gravity and air-magnetometer surveys of Amundsen will be positioned by the Decca Chain with master near Cape Parry. Base at Resolute will be expanded to support more extensive activity in 1973 and subsequent years. The glaciological program on Devon Island will be continued, supplemented by research teams from the United Kingdom. The International Biological Program and the North Water Project will continue as part of our international co-operation. Considerably more geological and geophysical activity will be supported out of Resolute in 1973.

The 1973 field program will involve approximately 300 persons. Aerial transport in the Mackenzie will be provided by one Bell 205A helicopter, two Bell 206B helicopters, one de Havilland DHC-3 Otter, one de Havilland DHC-6 Otter and one Beechcraft D-18S. Transport includes nine wheeled or tracked vehicles and about 22 motor toboggans and small amphibious vehicles. The off-shore studies will be co-ordinated with the *Parizeau* and other vessels, as appropriate. In addition to the base camps at Tuktoyaktuk and Resolute, the 1973 program requires that the Polar Continental Shelf Project operate camps at Herschel Island, Baillie Island, Cape Parry, Cape Wankarem, Sachs Harbour, Bathurst Island and Somerset Island.

RESOURCE MANAGEMENT AND CONSERVATION BRANCH

Responsibilities

In accordance with the Oil and Gas Production and Conservation Act and the Public Lands Grants Act, the Resource Management and Conservation Branch administers and manages the mineral resources underlying Hudson Bay and Hudson Strait. The branch exercises comprehensive statutory authority and complete regulatory control over the exploration for and development of offshore mineral resources in these as well as in other offshore areas under the jurisdiction of the department.

Long-term Plans

The branch will continue to manage offshore mineral resources in those areas of the Canadian North administered by the department in a manner consistent with the public interest and with special emphasis on:

- safety of human life,
- preservation of the environment and prevention of pollution,
- protection of marine life,
- optimum physical and economic conservation of mineral resources,
- optimum return for Canada from these resources
- co-ordination of offshore mineral resource activities with other users of the offshore.
- maintenance of industry investment on a continuing and orderly basis.

Review of 1972 Operations

At an estimated cost of \$115,000, more than 6,500 line miles of airborne magnetometer survey were flown over Hudson Bay in 1972. There was no marine seismic activity in the bay during the year, and no offshore wells were drilled. At the end of the year, total cumulative costs of exploration by industry in the Hudson Bay and Hudson Strait regions was \$13 million.

As of 31 December, 1972, a total of 632 Canada oil and gas permits covering 38.5 million acres were held by more than 29 different companies in Hudson Bay and Hudson Strait under the terms of the Canada Oil and Gas Land Regulations. During the year, 531 permits covering 32.9 million acres were terminated and the lands returned to the Crown.

Rights to offshore minerals, other than oil and gas, are recorded under the Canada Mining Regulations. At the end of the year

40 mineral claims covering 5,870 acres were held in the Hudson Bay area, and one mineral lease covering 78 acres was held in James Bay.

SURVEYS AND MAPPING BRANCH

Geodetic Survey of Canada

Responsibilities

In the North the Geodetic Survey is responsible for providing a framework of precise horizontal and vertical control, and for providing the lower order control survey fabrics and special surveys required for other government agencies, the petroleum industry, environmental studies, engineering and geosciences, the national mapping program and the orderly development of the North.

Long-term Plans

Long-term plans for operations in the North include the extension and densification of the precise horizontal and vertical control frameworks, in some cases by new Doppler satellite methods, the improvement and extension of the existing lower order control fabrics, and the provision of control for the 1/50,000 mapping program in those areas which are still unmapped at that scale.

Review of 1972 Operations

In the Yukon Territory an integrated system of second-order grid traversing and trigonometric and barometric heighting was established to provide control for a block of eighty 1/50,000 map sheets in the Peel Plateau area, and to serve as a multi-purpose, good quality monumented control system for future use in the area. First-order level lines were established from Watson Lake to Ross River along Highway 9, and from Highway 9 along Highway 10 to Tungsten. This was the first year of a four to five year project to establish precise level lines along the highway system.

In the Northwest Territories a first-order level line was started down the Mackenzie River from Fort Providence: the line was completed to a point approximately 50 miles north of Fort Simpson. This level line, which will take two to three more years to complete to Tuktoyaktuk, will provide vertical control for the development of the Mackenzie waterway and corridor, and will establish the first tie of the national vertical control framework to the Arctic Ocean.

In northern Ontario, Aerodist (an airborne electronic distance measuring system

for establishing horizontal control at a station spacing of 60 to 100 miles) was used to provide a framework covering the area from Highway 11 in the south to James Bay and Hudson Bay in the north, and from the Quebec border in the east to existing Aerodist control extending north from Lake Nipigon in the west. Extension and improvement of existing barometric vertical control was carried out to meet the requirements of the 1/50,000 mapping program in the Aerodist area of northern Ontario, and in northern Manitoba and Saskatchewan, adjacent to the 60th parallel. In Labrador a first-order level line was completed from Churchill Falls to Goose Bay.

Plans for 1973

In the Yukon Territory, as a continuation of the highway levelling program, level lines will be extended along Highway 9 from Ross River to Carmacks, and from Johnsons Crossing along Highway 8 through Ross River to MacMillan Pass.

In the Northwest Territories the Mackenzie River levelling will be continued; it is expected that this line will reach Fort Norman in 1973. A precise base line will be established by Doppler satellite methods between Pearce Point and Cape Baring on the Amundson Gulf. This base line will provide control for a study of Decca wave propagation being carried out by the Canadian Hydrographic Service.

In the eastern part of the District of Mackenzie and in the District of Keewatin the existing lower-order survey fabrics will be extended and improved, and control will be provided for the 1/50,000 mapping program throughout the area.

In northern Ontario Aerodist control will be completed to the Manitoba border, and a network will be established across northern Manitoba between the 57th and 60th parallels; improvement of existing barometric vertical control for the 1/50,000 mapping program will be carried out in various parts of this area. In northern Quebec, west of 68° and north of 54°, the lower-order vertical and horizontal control fabrics will be improved, and vertical control for the 1/50,000 mapping program will be established by barometric heighting in a large block between the 54th and 58th parallels.

The 1972-73 work of the Geodetic Survey is shown on the accompanying map on page 52.

Legal Surveys Division

Responsibilities

- To carry out surveys for land or resource transactions connected with the administration and development of public or other lands.
- To ensure the competence of the property surveys, land descriptions and plans made under the Canada Lands Surveys and other regulations, and to manage such surveys on request.
- To fulfill the federal obligations regarding definition, survey and maintenance of provincial and territorial boundaries of or in Canada.

Long-term Plans

These are dependent upon the planning and development of other government departments, chiefly Indian Affairs and Northern Development. It is proposed to carry out subdivision surveys in the settlements in the North to promote and facilitate development of these areas. Similarly, surveys of group lots, camp sites and other parcels will be made along highways as development is undertaken by the Territorial governments. The laying out of lots for airstrips, the location of navigational aids and similar work will be carried out in conjunction with the Ministry of Transport. Co-ordinate control survey areas will continue to be established in the major settlements in the North. These areas feature an integrated system of permanent reference monuments which can be used to facilitate and correlate all future surveys in these settlements required for engineering, mapping, cadastral and other development purposes. Because of the referencing role of these monuments, extraordinary precautions, such as setting markers in cast iron wells beneath city streets, are taken to ensure that they will not be disturbed by construction, grading or snow plowing.

Review of 1972 Operations

A significant development was the establishment of regional survey offices in Whitehorse and Yellowknife with resident surveyors, to provide a better legal survey service and to improve liaison with the Department of Indian Affairs and Northern Development and with the Territorial governments.

Yukon

Subdivision surveys were carried out at Tagish Beach (59 lots) and at Deep Creek (17 lots) for the orderly development of Indian settlements. A total of 20 lots was surveyed in Whitehorse, Watson Lake, Barkerville and Carcross. Seven miles of oil pipeline right-of-way were surveyed near Whitehorse, 3/4 mile of railway right-of-way surveyed in Whitehorse and 1 1/2 miles of highway relocation near Watson Lake.

Northwest Territories

Subdivision surveys were carried out at Cape Dorset (108 lots), Pond Inlet (45 lots), Coral Harbour (20 lots), Frobisher Bay (15 lots), Edzo (20 lots), Pine Point (20 lots), Fort McPherson (80 lots) in Eskimo and Indian settlements to ensure the orderly provision of services. A total of 65 individual group lots was surveyed at scattered locations. These consist of mining claims, ranger sites, camp sites, surveys for individuals and various government agencies. Navigation beacons were surveyed at Pond Inlet and Cape Dorset. A control survey was carried out at an Indian village near Yellowknife for large-scale mapping purposes. Co-ordinate control survey monuments were placed at Hay River, and the major portion of the survey completed.

Plans for 1973

Yukon

In a project carried out in co-operation with the government of B.C., the boundary line between the Yukon and British Columbia will be maintained and brushed out. Three miles of relocated highway will be surveyed near Whitehorse. Group lots will be surveyed for the Yukon Forest Service at Frances Lake, Carmacks, Teslin, Ross River, Faro, Old Crow, Beaver Creek and Dawson. Six surveys will be made of proposed parks and camp sites, near Whitehorse, Watson Lake, Faro (300-acre park), Dawson and the Dempster Highway. Eight subdivision surveys will be carried out at Whitehorse and other centres, the number of lots and location not having been specified as yet.

Northwest Territories

Subdivisions will be surveyed at Cape Dorset (120 lots), Frobisher Bay (15 lots) and at Fort Liard, Fort McPherson, Tuktoyaktuk. The co-ordinate control project at Hay River will be completed; control monuments will be established along Highway 4 east of Yellowknife to control development along the highway.

*International Boundary Commission***Responsibilities**

To provide for the effective maintenance of Canada's international boundary and to determine the position of any part thereof in boundary questions arise.

Long-term Plans

To carry out survey and maintenance operations, as deemed necessary, for the effective maintenance of the international boundary in the North.

Review of 1972 Operations

The commission had no operations in the North during the year.

Plans for 1973

A joint Canada-United States field operation will be carried out on the northern section of the Yukon-Alaska boundary. It will provide essential maintenance to preserve the system of survey stations installed at considerable initial cost and which provide control for resource development in this region. This will be the start of a two-season project along the Yukon-Alaska boundary.

*Topographical Survey Directorate***Responsibilities**

To produce and maintain the National Topographic Series of maps at the 1:25,000, 1:50,000 and 1:250,000 scales; to administer through the Interdepartmental Committee on Air Surveys the acquisition of aerial photography for northern mapping development purposes; to provide reproduction services to the Canada Centre for Remote Sensing, a new facility inaugurated in 1972 whereby impulses from an aerial film which was launched in the same way are transformed to photographs in black and white and in colour.

Long-term Plans

The long-term plans of the directorate are to complete mapping coverage of northern Canada at the 1:50,000 scale by 1995 with a view of high resource potential as priorities to revise existing mapping. To set out a network of points identified by aerial photographs at about four-mile intervals which will be surveyed by photogrammetric processes to an accuracy of about 10 metres in horizontal position and about 20 feet in elevation. This network will cover all areas of the North not mapped at 1:50,000. It will be used principally for

mapping but will have secondary uses such as the location of mineral claims, property boundaries, etc. The complete installation of this network will take about five years.

Review of 1972 Operations

During the year 52 line maps at the 1:50,000 scale were compiled for areas north of the 60th parallel and 13 existing line maps were updated by new information. In addition, 80 photomaps at the 1:50,000 scale and four at the 1:250,000 scale were produced during the year.

Three special maps were completed at various scales; Kennedy Channel, Hay River and Resolute Bay.

A total of 14,150 line-miles of aerial photography were flown, principally in the western area of the Northwest Territories and in the Yukon Territory.

The present status of 1:50,000 mapping is shown on the accompanying map on page 53.

Plans for 1973

Arrangements are under way to revise large-scale plans of 31 northern sites for the Department of Indian Affairs and Northern Development. Approximately 100 new 1:50,000 scale maps are scheduled for publication and six maps, mostly in the 1:250,000 series, will be revised. Most of the new mapping activity is in Mackenzie Valley.

It is also anticipated that 22,600 line-miles of aerial photography will be flown in the area of northern Quebec, the western area of the Northwest Territories and in the Yukon Territory.

*Directorate of Map Production***Responsibilities**

The directorate is responsible for drafting and printing all maps of the National Topographic Series; the compilation and printing of small-scale maps, bilingual district maps and aeronautical charts; the production of flight information publications; the design, compilation and printing of the National Atlas of Canada, and the provision of cartographic support services to federal and provincial government departments and to private agencies.

Long-term Plans

The long-term plans are to assist in the publication of the National Topographic Series of maps for all Canada, to maintain production of small-scale maps, to publish the National Atlas on a 10-year cycle, and to

maintain up-to-date aeronautical documents, and to promote the development of new methods and techniques of cartography that will benefit the Canadian economy in the North.

Review of 1972 Operations

The following new or revised National Topographic Series maps in northern Canada, were printed in 1972:

- 43 multicolour maps at a scale of 1:50,000
- 4 multicolour maps at a scale of 1:250,000
- 29 monochrome advance prints at a scale of 1:50,000
- 7 photo maps at a scale of 1:50,000

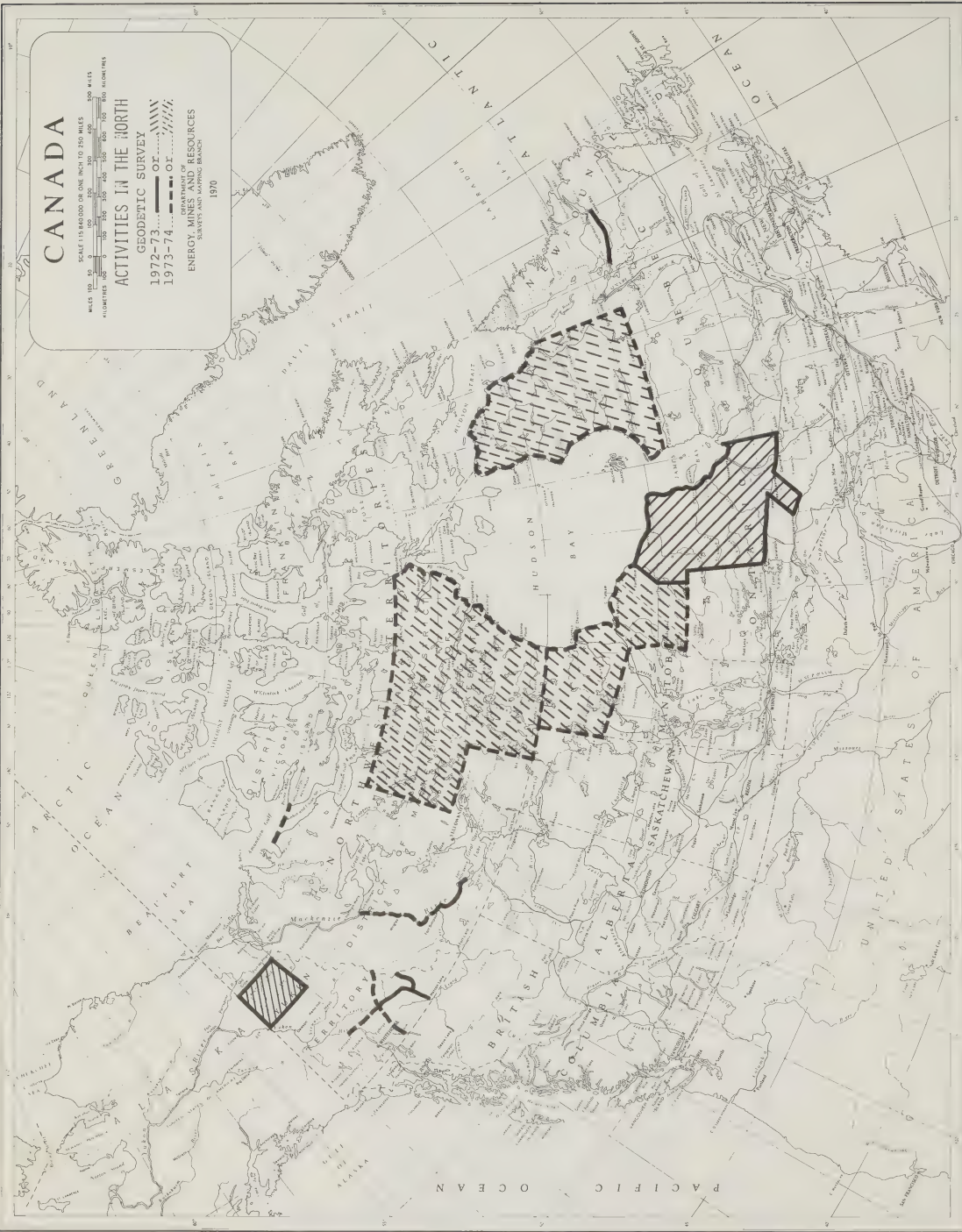
Also printed was a new map of Arctic safety shipping zones for the Ministry of Transport and a revised map showing transportation facilities in northwest Canada. The present status of 1:50,000 scale mapping is shown on the accompanying map on page 54.

The first topographic map using automated techniques was produced: it is the Mount Mye sheet in the Yukon Territory.

Publication of aeronautical data was maintained, including Enroute Charts and Enroute Supplement, Northern Aerodrome Supplement to the Canada Air Pilot, and the Military Pilot Handbook. Also maintained were five special topographic aeronautical charts for Arctic weather stations at Isachsen, Cornwallis Island, Eureka, Alert and Mould Bay.

Plans for 1973

A new map of the Yukon Territory at a scale of 1:1,000,000 will be published. Also planned is the production of a new military-civilian aeronautical publication which will contain all instrument approach procedure charts, radio aids to navigation, land and water aerodromes and landing sites and their facilities for the Yukon and Northwest Territories. This publication will replace the Northern Aerodrome Supplement and the Northern Military Pilot Handbook.







CANADA

1:50,000 MAPPING

Completed to December 31, 1972

Compilations in hand, 1973



TASK FORCE ON NORTHERN OIL DEVELOPMENT

The Task Force on Northern Oil Development was established in December 1968 to advise the federal government on regional and national matters relating to northern oil development. It conducts studies and makes recommendations concerning oil and gas exploration, production, transportation and marketing, with particular emphasis on the transportation. The task force is chaired by the deputy minister of Energy, Mines and Resources and includes the deputy ministers of Indian Affairs and Northern Development, the Environment, and Transport, and the chairman of the National Energy Board.

The task force, comprising six committees, studies and does appraisals. The Pipeline Engineering Committee provides a continuing appraisal of engineering matters relating to the construction and operation of oil and gas pipelines in the North, with emphasis on standards for design, construction, operation, maintenance and safety. The Marketing Committee is responsible for assessing the possible effects of northern oil and gas on the energy supply and demand patterns of North America, with particular emphasis on marketing patterns in the northern and central parts of the continent. The Transport Committee examines all transportation and related matters, including other alternatives to pipeline transportation. It has also been concerned with a type of research that would be required to establish harbours and transportation routes in the High Arctic. The Economic Impact Committee assesses the expected impact on the economy of the construction and operation of northern pipelines, paying particular attention to the impact on the economy of expenditures associated with large capital investments required for pipelines. The Industrial Supply Committee is assessing the capability of the economy to supply the materials and equipment required for northern pipeline construction. The Environmental-Social Committee is responsible for environmental and related geological studies of the consequence of pipeline construction, as well as other pipeline-oriented studies and is conducting a year program with the support of the departments of the Environment, Indian Affairs and Northern Development, and Energy, Mines and Resources with an annual budget of \$5 million.

During 1972 the Task Force met with various groups who are proposing to build

northern pipelines. In addition, there was continuing contact between task force committees and representatives of northern communities having a direct interest in plans for northern oil development and transportation, and with groups representative of the general public. During 1973 task force committees will continue with their programs, all of which are directed towards full and careful assessment of existing and proposed oil and gas activities in the North from engineering environmental, sociological, economic, and regional and national interest points of view.

The following projects constituted the program of the environmental-social committee of the task force on northern oil development during 1972. The department or agency carrying out each project is indicated opposite the project title as follows: Department of the Environment — DOE; Department of Energy, Mines and Resources — EMR; Department of Indian Affairs and Northern Development — INA; Northwest Territories Government — NWT; National Energy Board — NEB.

Mackenzie-Porcupine River aquatic ecology	DOE
Fish resources of the Mackenzie River Valley	DOE
Fish resources of the northern Yukon	DOE
Water quality studies in the Mackenzie Basin and northern Yukon	DOE
Mapping of wildlife habitat and animal concentrations	DOE
Landscape survey in the upper and central Mackenzie River Valley	DOE
Some case histories on the effects of disturbance in the Mackenzie Valley	DOE
Terrain, vegetation and permafrost relationships in the northern part of the Mackenzie Valley and northern Yukon	DOE
Intensive stream survey of the Martin River, NWT	DOE
Environmental impact on the Martin and Rengleg River	DOE
Study of near ground atmospheric diffusion along the Mackenzie Valley	DOE
Impact study of the Dempster Highway on the Caribou Migration	DOE
Boot Creek and Peter Lake watersheds, Mackenzie Delta region	DOE
Mackenzie Basin water balance study	DOE
Seasonal distribution of flow in the Mackenzie Delta	DOE
The stability of river banks and slopes along the Liard River and Mackenzie River, Northwest Territories	DOE
Data (1971) on height, frequency of floods, ice jamming and tree-ring studies	DOE
Break-up and ice jamming on the Mackenzie River, NWT	DOE
Locations of spring ice jamming on the Mackenzie River, NWT	DOE
Documentation of an extreme summer storm in the Mackenzie Mountains, NWT	DOE
Hydrologic aspects of northern pipeline development	DOE
Aerial reconnaissance and study of rivers in the Mackenzie Basin, NWT	DOE
Dendrochronological investigations along the Mackenzie, Liard and South Nahanni Rivers, NWT. Part 1: using tree damage to date, landslides, ice jamming and flooding	DOE
Susceptibility to frost heaving of soils at selected sites along the Liard River Valley, determined by pore pressure measurements	DOE
Hydrologic processes in a sub-Arctic upland watershed	DOE
Precipitation frequencies and intensities along proposed pipeline routes in the Mackenzie Valley, NWT	DOE
Geomorphic and hydrologic characteristics of Mackenzie River tributary basins	DOE
Topographic mapping and air photography	EMR
Temperature characteristics of permafrost	EMR
Terrain conditions, Mackenzie Valley and Northern Yukon from latitude 64°N to 68°N — commentary to accompany surficial geology maps	EMR
Quaternary geology, Beaufort Mackenzie (terrain conditions north of latitude 68°N — to accompany surficial geology maps)	EMR
Terrain conditions Mackenzie Valley region latitude 60°N to 64°N — commentary to accompany surficial geology maps	EMR
Bottom-morphology and general sub-bottom geology of the continental shelf area of the Beaufort Sea	EMR

Stability of natural slopes in the Mackenzie Valley	EMR
Application of shallow seismic methods to mapping of frozen surficial material	EMR
Thermal and engineering geological characteristics of soils, Norman Wells-Fort Good Hope area	EMR
Geomorphic and sedimentologic processes of rivers and coasts, Yukon coastal plain	EMR
Some effects of surface disturbance on the permafrost active layer at Inuvik, NWT	EMR
Terrain sensitivity evaluation and mapping Mackenzie Valley transportation corridor	EMR
Progress report of the physical metallurgy division	EMR
Terrain disturbance in the western Canadian Arctic	INA
Surface disturbances in the tundra region	INA
Long term effects of summer traffic by tracked vehicles on tundra	INA
Ecology of surface disturbance in the Mackenzie Delta	INA
Energy budget components in an Arctic environment	INA
Soils, vegetation, landforms, Wrigley, NWT	INA
Treatment and disposal of wastes from Arctic and sub-Arctic workcamps	INA
Oil spills on terrestrial and aquatic vegetation at Norman Wells, NWT	INA
The physical aspects of crude oil spills on northern terrain	INA
Oil spillage on microorganisms in northern Canadian soils	INA
Fluorescence as a means of detecting pipeline leaks	INA
Biodegradability of northern Canadian crude oil	INA
Use of swampland as a natural sink for receipt of sewage effluent	INA
Trans-Canadian archaeological salvage project	INA
Regional impact of a northern pipeline	INA
Social impact on Old Crow of Porcupine route Vs. coastal route for a pipeline	INA
Native settlements information education program	INA
Porcupine caribou population study for game management planning	NWT
Evaluation of fur resource along proposed pipeline and highway route	NWT
Northern pipeline NWT development plan	NWT
Overview study of the sociological effects of highway and pipeline development on people and communities of the Mackenzie Valley	NWT
Development of pipeline regulations	NEB

DEPARTMENT OF THE ENVIRONMENT (OE)

ATMOSPHERIC ENVIRONMENT SERVICE (A.E.S.)

Responsibilities

To provide historical, current and predictive meteorological, ice and sea-state information services for northern areas.

To undertake research and development in support of these services, and research to improve knowledge of atmospheric processes and the dynamics of ice and wind-wave interactions.

To provide advice and consultation on the effect of meteorological, ice and sea-state conditions on natural processes and on human activities in the Arctic.

To monitor air quality (composition of the atmosphere) and to provide advice and consultation on the effect of human activities on the atmosphere in the Arctic.

Long-term Plans (Arctic)

To increase knowledge of the Arctic atmospheric environment, its effect on other natural environmental processes and on human activities, and the effect of human activities on the Arctic atmospheric environment.

To continue to assist other agencies by providing meteorological support for joint projects directed to better understanding of the total Arctic environment, defining the economic potential of the North and supporting the Arctic economy.

To extend the operational and climatological atmospheric data acquisition network in the Arctic essential to the extension of knowledge and improvement of meteorological and climatological services of that area.

- To improve the meteorological instrumentation adapted to Arctic environment and, in particular, to develop the capabilities of, and increase the use of, automatic equipment.
- To improve meteorological communications throughout the Arctic, utilizing satellite facilities where practicable.
- To extend and improve the meteorological forecasts in the Arctic, particularly those in support of transportation, construction and industry.
- To improve and extend aerial ice reconnaissance in the Arctic to a year-round, day and night, all-weather operation to meet the growing economic needs of the North.
- To archive Arctic ice data and to prepare and publish an Arctic Ice Atlas.
- To monitor air quality (composition of the atmosphere) in the Arctic in sufficient detail to facilitate the enforcement of the Clean Air Act and to identify global and regional climatic trends.
- To participate in constructive international programs for increasing knowledge of the Arctic environment.
- To employ more indigenous residents in meteorological activities.

Review of 1972 Operations

The Atmospheric Environment Service continued to operate several extensive meteorological observing networks to provide the necessary basic data for a growing group of users of meteorological information in northern Canada. The stations in these networks carried out combinations of upper-air, surface synoptic,

aviation hourly, climatological, and supplemental observational projects.

Fifty-eight principal stations provided detailed data such as: sky condition, visibility, weather, obstructions to vision, atmospheric pressure, temperatures, wind direction and speed, altimeter setting, and clouds. Four of these stations were established during 1972: Fort Providence, Snowdrift, Johnson Point and Faro.

Fifteen of these principal stations provided upper air data. These data consisted of pressure, temperatures, relative humidity, wind speed and direction at intervals through to heights of 100,000 feet.

In addition to the network of principal stations, there were forty-two climatological stations which carried out daily measurements of temperature extremes and precipitation.

Of particular significance to the North, 25 stations carried out weekly measurements of the snow cover, the depth of the snow pack and its water equivalent; 62 sites reporting seasonal freeze-up and break-up of nearby bodies of water, and 27 sites making regular measurements of ice thickness. In addition, a number of stations measured soil temperatures at several levels below the ground, the frost depth in the ground, evaporation, bright sunshine, electromagnetic radiation of solar and terrestrial emission and total ozone.

Seismic observations were carried out for the Department of Energy, Mines and Resources at Inuvik, Frobisher and Whitehorse, and assistance was given to similar work at Resolute, Alert and Mould Bay.

The upper air station at Frobisher was re-located to Inuvik where construction began in June.

The weather stations at Holman Island and Spence Bay ceased operating in 1972,

although negotiations are under way to recruit new weather observers.

A tentative site for an observation station was selected at Thelon River.

A symbolic flag-lowering ceremony was held by Canada and the United States at Resolute on 27 August to officially terminate the joint operation of the five high-Arctic stations: Resolute, Isachsen, Eureka, Mould Bay, and Alert. The last of the U.S. personnel actually left Resolute in July 1972. These high-Arctic stations, now fully Canadian, besides continuing their full meteorological program, provided base support for various scientific activities, both government and commercial, through communication and airfield facilities, accommodation, and messing.

Two of the weather stations in the North are maintained through contractual agreements with indigenous people. The station at Old Crow, Yukon, is with the Indian co-operative at that site, and the station at Cape Dorset, NWT is with the Eskimo co-operative. The only other native-run station north of 60° is at Koartak, Quebec, an Eskimo community.

The inspection program, to provide on-site training and standards control for instrument exposure, instrumentation, installation, operation and maintenance, was increased during 1972. It has been realized that, as a general rule, more time than the Canadian average is required at the northern sites, due to the environmental parameters, the increased use of contract-type stations, and the plans to encourage and involve the natives in meteorological work.

With 17 participating stations, the Noctilucent Cloud Network remained unchanged. The collecting of radioactive fall-out samples is continuing at five stations as a joint project with the Radiation Protection Division of the Department of National Health and Welfare. One new installation of solar radiation equipment brought to 15 the number of stations in the North with recording apparatus for radiation detection. The Sunshine Recorder Network was unchanged at 18 stations. Ozone observing was conducted at only one site in the Arctic. Autographic rain recorders were increased from 10 to 15, and the autographic wind network was increased from 22 stations to 28.

The staffing of the principal weather stations was as follows: AES 17; AES/CATA(MOT) 7; CATA(MOT) 10; OMSI Dewline 11; and contract 13.

To make this weather data available on a real time basis to both national and international users, as well as providing a return flow of forecasts and advisories, the AES uses a number of communication facilities. Where appropriate, both teletype and facsimile communications are used through a combination of MOT-operated radio circuits, circuits in the DEW Line forward scatter facilities, and lease of circuits from the common carriers.

Direct transmission of weather facsimile charts for Whitehorse to Inuvik became possible via the CNT radio micro-wave troposcatter system. Other areas of the Central High Arctic are served by radio facsimile broadcast from VFE Edmonton. Ice reconnaissance aircraft landing at Inuvik or Frobisher can now make direct transmission of ice data in facsimile chart format over telephone or broadband circuits to Ice Central Ottawa.

Weather forecasts for the North are prepared on a scheduled basis by the AES. The technique of weather forecasting utilizes the data received from the North as well as that from all the northern hemisphere. The Canadian Meteorological Centre (CMC) in Montreal is responsible for broad-scale weather analyses, prognoses, and selected forecast material. This centre is supported by a large computer, has access to weather satellite data and also has access to products from the World Meteorological Centre in Washington. Output from the CMC is distributed via teletype and facsimile throughout Canada, including the North, to support forecasting and weather service activities. The Arctic Weather Central/Weather Office produces forecasts for most of the Arctic. Forecasts for the Yukon are produced at Whitehorse and those for Baffin Island by Goose Bay.

Current and predicted weather information for northern areas was routinely supplied during 1972 as follows:

- High-level winds and temperatures for aviation produced by computer in Washington and distributed in Canada by facsimile.
- Lower-level winds and temperatures for aviation produced by computer in the CMC in Montreal and distributed by teletype.
- Weather forecasts for aviation in the North were issued from the Whitehorse weather office, Goose Bay weather office, and the Edmonton Arctic weather office, and distributed by teletype and

radio. During 1972 the areas covered by such forecasts were expanded and terminal and advisory forecasts were added for several new airports used particularly by the oil industry.

- A general weather summary and forecast for the Arctic is prepared at Edmonton. More detailed forecasts for the general public are prepared at Whitehorse for southern and central Yukon, at Edmonton for the Mackenzie Valley, and at Frobisher for southeastern Baffin Island. These forecasts reach the public through the CBC northern networks and other private commercial radio and TV outlets.
- Marine forecasts are prepared during the shipping season for Arctic coastal waters, Hudson Bay and the inland waters of Great Slave Lake, Great Bear Lake and the Mackenzie River. These forecasts are broadcast by MOT Marine Radio Station on regular schedules.
- Fire-weather forecasts are prepared during the forest fire hazard season. Whitehorse prepares these for the Yukon Forest Service and the Edmonton Arctic office for the Northwest Lands and Forest Service.
- Weather services consisting of briefing, presentation, and consultation are available at Whitehorse, Yellowknife, Inuvik, Resolute, Frobisher Bay, and Churchill. A more limited type of weather service is available at many other points but these take the form of a request and reply service.
- A meteorologist was added to the staff at Yellowknife to provide a more professional consultation service. The staff at Inuvik was also upgraded to provide briefing/presentation service over extended hours.
- Instruments for measuring meteorological parameters were replaced or installed at a number of sites. Specialized instrumentation for use in the arctic climate and with a potential for automation are being developed and evaluated. Schneider thermometers able to measure temperatures down to -70°F were installed and evaluated as successful at 10 northern sites. These thermometers will be installed so that all northern sites will be equipped to measure these extremely low temperatures.
- Under the supervision of the Atmospheric Instruments Branch, there was a field

evaluation at Resolute of a self-contained, battery-operated, unattended, climatological automated recording station (ARS). This model records wind run, wind direction, air temperature and precipitation at three-hourly intervals by means of a cassette magnetic tape with a one year recording span.

The Central Service Directorate's activities relating to the North were to provide meteorological assistance to those responsible for Arctic policies, planning, development, operations and conservation: projects related in one way or another to the high rate of exploration and development in this area.

A detailed regional climatology of the Mackenzie Valley — Beaufort Sea was completed during the year. Publication of the multicolour, two-volume study is expected by mid-1973. A companion study, *The Climate of the Yukon*, is under way.

An investigation along the Mackenzie Valley will delineate and relate quantitatively, snow accumulation patterns under different types of topography, climatic conditions and vegetal cover, and will provide information on the fundamental role of snow as a protective cover for permafrost, a habitat for most forms of life, and as a water supply.

To provide assistance to operational projects in the North, climatic analyses were completed in 1972 for a number of additional airstrip sites including Fort Simpson, Igloolik, Cape Dorset and Foul Bay Harbour. Similar analyses had previously been prepared for Eskimo Point, Whale Cove, Chesterfield, Old Barrow, and Aklavik.

In chapter, "The Climate of the Mackenzie River Basin", was completed for inclusion in *Sailing Directions for the Mackenzie River and Great Slave Lake* published by the Canadian Hydrographic Service.

In preparation for in-depth climatic assessments of Baffin Island, Nahanni and Kluane National parks, preliminary climatic inventory reports have been completed for Baffin Island and Nahanni National Parks. Analysis for Kluane Park is being completed.

Fifteen rainstorms in northern Canada have been analyzed for use in large hydrologic design studies, and published in the "Normal Rainfall in Canada" series. For

use in the design of smaller structures (culverts, storm sewers, etc.), the probabilities of extreme short-duration rainfalls at Whitehorse, Haines Junction and Yellowknife were computed using all available data to the end of 1971.

- Normal temperature and precipitation values for the Yukon and Northwest Territories during the period 1941-70 were published. Hourly data-type summaries have been prepared for Inuvik, Cape Dyer, Cape Parry and Dawson; publication is expected in March 1973. National summaries of climatic data, which include observations from several locations in the Yukon and Northwest Territories, were published for such climatic parameters as sunshine, fog and frost.

Ice Forecasting Central (A.E.S., Ottawa) provided tactical and long-range ice forecasts for Hudson Bay, Foxe Basin, and the Eastern and Western Arctic during the summer months, as has been done for several years. The short-range forecasts were forwarded to marine radio stations at Frobisher, Churchill, Resolute Bay, Cambridge Bay and Inuvik for broadcast or for relay to specific ships. The longer-range forecasts were distributed by mail.

In Hudson Bay forecasting begins in early July and continues until early November. The 1972 season was late in this area, and considerable ice from Foxe Basin so hindered late passage that forecasting was required well into November: two to three weeks later than normal. Forecasts for the Arctic areas began in mid-July and continued until early October. The season in the Eastern Arctic was late and break-up was limited, but a good year was experienced in the Beaufort Sea.

In addition to the above, ice information received from the reconnaissance aircraft was also broadcast by facsimile over CFH, Halifax, and VFE, Edmonton. These relays were performed from early July until mid-November. Charts of existing conditions were mailed weekly to a list of 50 to 100 subscribers in Hudson Bay, Eastern Arctic and Western Arctic. These charts, too, were available from mid-June until November.

In 1973 the operational program is not expected to be changed significantly, although the beginning and completion of forecast preparation will depend on shipping conditions and the timing of the activity. If special probes are conducted by icebreakers, support will be provided as required.

In anticipation of off-shore oil drilling in the Beaufort Sea and in Hudson Bay, experimental forecasts were prepared but were not distributed. During the winter an evaluation of the results seems to indicate that forecasting the entry and exit requirements in Hudson Bay can be done, but the trial in the Beaufort Sea was inconclusive. Both trial forecasts will be repeated in the coming year.

In addition to the above some analyses of data in response to queries from individual companies have also been required, and these too will continue in the coming year.

A.E.S. Ice Observers accompanied flights totalling 3,070 flying hours on operations north of 60°N. Of this figure, 2,113 flying hours were chartered by the AES, using principally two DC-4 aircraft and one DC-3 aircraft. The first ice reconnaissance flight into Arctic waters occurred during early February when assistance was given to CCGS *Louis St. Laurent*. Remote sensing techniques under conditions of darkness aided the vessel as far as 72°N, but continued heavy ice and low reserves of fuel forced the vessel to return south.

Of the 900 flying hours classified as non-revenue, the bulk was flown on Canadian Forces Maritime Command aircraft as a co-operative venture. Helicopters were assigned to Canadian Coast Guard icebreakers and a few special projects.

Atmospheric Environment Service Ice Observers served 807 man-days of duty on Canadian Coast Guard Icebreakers in the Arctic.

In addition to the primary task, more than 1,700 airborne facsimile transmissions from ice reconnaissance aircraft direct to the icebreaker were carried out. More than 2,000 hourly aerial meteorological reports were made over sparsely populated areas and sea areas, as well as significant sea mammal and wild-life sightings.

Marine weather observations were obtained from eight MOT icebreakers and supply ships operating in the Hudson Bay, eastern and western Arctic, as well as from ships operating in the Western Arctic and Mackenzie River. Dates of freeze-up and break-up of water bodies were obtained from 58 stations in the Northwest Territories and Yukon, and from six stations in Arctic Quebec.

Twenty-five regular ice-thickness stations contributed data from freeze-up to break-up at selected sites having significant sea- and fresh-water exposures. Thirty-five selected stations operated by a variety of agencies

contributed daily shore-ice reports during the navigation season.

Plans for 1973

- Completion of the Inuvik upper-air observing station and relocating in the new operations building.
- Construction and improvement work at the four high-Arctic stations, Alert, Eureka, Isachsen and Mould Bay, which will include sewage disposal facilities, garages, warehouses, living quarters.
- Construction of additional housing at Frobisher Bay.
- Begin two-year reconstruction and relocation of the Clyde River surface weather station. Plans are to train Eskimo people for this weather observing work.
- Increase meteorological services at Komakuk Beach, Single Point, Nicholson Peninsula, Cape Young, Lady Franklin Point, and Shepherd Bay to four full observations daily. Continuous wind-recording instruments will be installed at these six sites.
- Begin partial weather observing services at Pond Inlet, Igloolik, Rankin Inlet, Fort Franklin, Rae, Grise Fiord, and Colville Lake. These services will involve native people to the greatest extent possible.
- Develop climatological stations including the registration of wind records at Eskimo Point, Gjoa Haven, Repulse Bay, and Whale Cove. Work will be done by contract with local residents.
- Establish climatological stations consisting of thermographs and storage-precipitation gauges at three Yukon and two NWT locations.
- Increase weather observing services at Alert, Isachsen, Mould Bay and Eureka to 24 hourly observations a day.
- Install a network of storage-precipitation gauges in a "traverse" across the Mackenzie Mountains to help describe the pattern of precipitation across this barrier.
- Continue the evaluation of an updated climatological automated recording station (CARS) at Resolute and at one or two other northern stations. Tape recorder design is being improved to accept additional reliable sensors as they become available, and to increase the

data-packing density so that eight parameters can be measured and recorded on a single tape for up to one year.

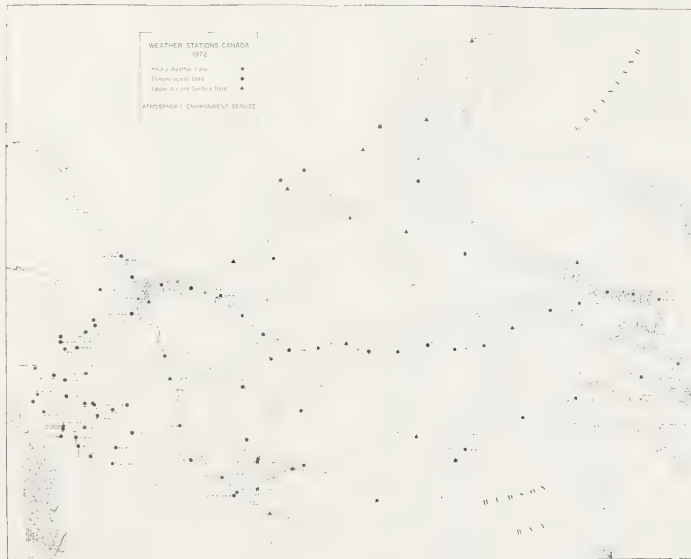
- Increase the inspection staff by two, with one to concentrate on the Yukon and Mackenzie area and the other on the Dew-line.
- Increase meteorological and ice services to support exploration for natural resources in the Beaufort Sea.
- Where necessary, to increase weather information services, especially by the use of airborne equipment.
- Increase use of satellite ANIK in communications, providing the desired quality can be achieved and financial arrangements worked out.
- Completion of detailed coastal and marine climatic study of Hudson Bay, Hudson Strait and the Labrador coastline for publication in the Labrador and Hudson Bay Pilot.
- Detailed proposals in connection with Arctic Island Pipeline Related Studies in 1973-74 have been submitted to: (1) develop a regional climatology for the Arctic Islands, and (2) obtain information on the spatial and temporal variations of snow cover and to develop a predictive model based on relationships of different land forms, physiography, and climatic condition of snow cover accumulation patterns.
- To participate in North Water Air-sea-ice interaction experiment later this year.

On 1 November 1972 a five-year contract was awarded to Nordair Ltd. of Montreal to provide two Electra L188C aircraft. The same contract calls for two independent inertial navigations systems, two independent Omega navigation systems, a high-resolution ventral-mounted radar and an auxiliary nose-mounted radar, a thermal mapper system, a laser profilometer system, and a tri-met 70mm camera array.

In addition to regularly collecting ice reconnaissance data and providing forecast services, AES will provide or try to provide:

- Testing and recommendations for the application of Texas Instruments line scan system over the Great Lakes and James Bay;
- Recommendations for the application of airborne radiation thermometer data in forecasting ice formation and decay;
- Collection of sub-surface temperature

data from disposable thermometers used by Canadian Coast Guard.



FISHERIES SERVICE

Resource Management Branch
(incorporating the former Resource Development and Conservation and Protection Branches)

Responsibilities

- To conserve and protect fishery resources and the aquatic environment.
- To manage and seek improvements in the management of the commercial, sport and Indian food fisheries.
- To coordinate federal-provincial programs.
- To promote education of, and maintain communication with industry, the general public and other government departments with regard to the responsibilities and aims of the Department of the Environment.
- To develop a thorough knowledge of the water resources of the North so that the impact of future industrial developments can be accurately assessed and evaluated.

Long-term Plans

- Maintenance and development of fish and mammal stocks in the North through the proper use of resources and equipment.
- Maintenance of the productive capacity of water resources at 1971 levels.
- Inventory of the fishery resource potential of the Northwest Territories.
- Investigation and management of the fisheries of Great Slave and Great Bear lakes.
- Establishment of a comprehensive plan to manage other lakes for sport and commercial fishing.
- Inventory and management of the stream sport fisheries based primarily upon the Arctic grayling.
- Compilation of a physical and biological inventory of all fish producing streams in the Yukon.
- Efficient management of the anadromous Arctic char fisheries of the north coast.
- Development of criteria for the protection of aquatic resources from pollution and environmental disturbances.
- Minimization of the adverse effects of industrial development by making recommendations to the developer, enforcing

regulations and understanding the resource.

- Development of new fisheries through aquaculture and the harvesting of hitherto underutilized species.

Review of 1972 Operations

- The investigation into the possible effects of proposed corridor developments upon the aquatic resources of the Mackenzie River valley was continued and a report on its fish resources published.
- In connection with the proposed pipeline developments an inventory of fish resources was continued in the Beaufort Sea drainage and the Porcupine River drainage.
- A bio-engineering study of Aishihik Lake in connection with a proposed hydro-electric development was completed, and a report prepared.
- Work continued on the catalogue of salmon escapements to the upper Yukon River drainage.
- Four pot-hole lakes in the Yukon Territory were stocked in the spring with ten thousand rainbow trout fingerlings and two thousand coho smolts, and harvested in June. A report has been prepared and will be available in 1973.
- A review of the NWT fisheries legislation was begun.
- The effect of sport fishing on the resources of Great Slave and Great Bear lakes was assessed with the emphasis on fishing lodge operations.
- Fishery studies on Great Slave Lake were continued with emphasis placed upon (a) commercial/sportsfish conflict, and (b) present and potential harvests of underutilized species.
- In co-operation with the Industrial Development Branch an investigation was completed of alternative harvesting methods for various species of fish in Great Slave Lake to increase both efficiency and selectivity of harvest, and a report published.
- A survey of the fishery resources of Pelly Bay area was completed.
- Studies on the effects of mining operations on the aquatic resources of

Great Slave Lake were continued. A preliminary report was prepared.

- Studies on the effects of mining operations at Yellowknife and at Great Bear Lake on the aquatic resources were completed and a report published.
- Studies on the effects of northern geophysical exploration for petroleum deposits on aquatic resources and environmental quality will continue and probable effects of highways, railroads and gas pipeline construction assessed.
- Branch staff played an active role in work of the Task Force on Fisheries Development in the Northwest Territories which completed its investigations and published its first report.
- Enforcement of commercial fishery regulations on Great Slave and other within the area of responsibility.
- Surveillance over recreational fishery enforcement of quotas where applicable.
- Gathering and compilation of statistics on the commercial, sport and domestic fisheries.
- Surveillance of industrial, logging, mining and other land use for environmental protection and clean-up where necessary.
- Surveillance of seismic operations in Mackenzie Valley and off-shore areas including the high Arctic to ensure compliance with departmental guidelines increased significantly over 1971.

Plans for 1973

All active 1972 field programs will continue in 1973.

- An increase in activities in the eastern Arctic will take place in connection with the proposed pipeline.
- A new set of fisheries regulations for the Northwest Territories will be introduced.
- Some expansion of the Arctic char investigations will take place.
- Studies on catch-release mortality in northern lakes and streams will be taken in an endeavour to establish efficient sports fishing management.
- Studies to determine probable environmental effects of industrial development in the North on its aquatic resources will continue.

the physical and biological inventory of Yukon fish producing streams will be continued.

A catalogue of the physical and ecological characteristics of the Teslin and Nisutlin drainages will be published in 1973. It is hoped that one such catalogue will be produced each year on each major drainage or sub-drainage in the Yukon.

A study of the gravel requirements of the Dempster Highway will be initiated.

The pot-hole lake survey will continue in the Yukon, with a greater number of monoids being used.

A portable salmonid hatchery will be designed and constructed for use in the Yukon.

Surveillance of seismic operations in the Mackenzie Valley, off-shore areas and the High Arctic is expected to continue at the 1972 level.

Production Branch

Responsibilities

Monitoring and standardizing of plants to ensure regulations are followed.

Technical assistance in handling, processing, transportation, storage and distribution of fish.

Laboratory analysis of domestic and imported products, plant sanitary surveys, and water and ice analyses to ensure regulations are followed.

Inspection of freshwater species to ensure market acceptance of domestic and imported fish and fish products.

Long-term Plans

The continued inspection of domestic and imported fish and fish products to maintain standards pertaining to hazardous substances, organoleptic, bacteriological and labelling requirements, and to assist industry in improving processing techniques and product development.

To complete current surveys aimed at determining what facilities are used for loading and transporting fish, i.e. boats, and vehicles and planes, to improve quality and eliminate rejection due to spoilage of five per cent of total fish loadings.

To implement a comprehensive fishing information system to improve the fish trade in Canada through diversifying

products and penetrating additional export markets.

- To initiate a certification program for commercial fishing vessels.

Review of 1972 Operations

- Annual registration of fish processing establishments in the Northwest Territories (there are five registered packing plants, one registered cannery, two registered plants for fresh and frozen fish and numerous non-registered packing plants).
- Setting up of an adult education program in co-operation with Territorial officials to aid primary commercial fishermen in catching, handling, and storing freshwater fish.
- Collection of end-of-line samples, water and ice samples, in-plant sanitary surveys, quality determination, *T. crassus* determinations.
- Setting up training courses at various locations for primary commercial fishermen and industry management personnel.

Plans for 1973

- To complete surveys of commercial fishing vessels as the basis for an inspection and certification program.
- To complete analytical surveys for hazardous substances on all affected freshwater species for commercially fished waters and imported fish and fishery products.
- To develop grade standards for fresh, frozen, canned, packaged, and cured fish and fishery products in order to establish baseline data on present quality levels from boats, plants, vehicles and retail outlets.
- To complete field retrieval and computer processing and working data on all facets of quality control and production including harvesting, transporting, processing, distribution, and all hazardous substances and labelling requirements on domestic and imported fish and fishery products.
- To conduct design development and modification studies on present construction equipment and operating requirements of plants within central region.

Fisheries Research Board of Canada

Arctic Biological Station (Ste. Anne de Bellevue, Que.)

Responsibilities

Biological investigation of the marine environment in Canada's North, especially the distribution and abundance of marine mammals and fishes and the factors that control production.

Long-term Plans

Biological assessment of fisheries resources will be continued to provide information for the management of fish and marine mammal stocks. Emphasis is on population studies, but physiological studies will be initiated in an attempt to relate these animals more closely to their environment and to the effects of disturbance by man. Marine productivity studies will be continued in order to provide a basis for assessment of possible environmental changes caused by exploitation of nonrenewable resources such as oil and gas.

Review of 1972 Operations

Marine mammals

A detailed study of the population of ringed seals was continued in the Holman Island area and further surveys of breeding seals were made on the ice of Amundsen Gulf. At Cape Parry during the open-water period seals were caught in nets and released after branding in a further attempt to learn more about the migrations of this species.

A survey of white whales summering in the Mackenzie delta gave an estimated population of 2000 animals.

Biological oceanography

Investigations continued on the marine ecology of the Eskimo Lakes, a series of estuarine embayments flowing into Liverpool Bay east of the Mackenzie delta. In addition to routine collection of plankton and benthos, microbiological samples were taken for detailed study at the research laboratory in Inuvik, and later at Ste. Anne de Bellevue. Numerous isolates of marine heterotrophic bacteria were evaluated for key metabolic and growth characteristics.

Marine fishes

Further studies on the abundance of benthic fishes, particularly the arctic sole, were carried out in Liverpool Bay, just east of the Mackenzie delta.

Plans for 1973

Study of the ringed seal will be continued at Coppermine. Further information on the predation of seals by polar bears and foxes will be obtained in collaboration with the

Canadian Wildlife Service. Live ringed seals, captured for migration studies, will also be used for studies of growth and metabolism. Some attempt will also be made to study the effects of seismic activity and pollution by oil on this species.

In connection with a proposed pipeline from the Arctic islands, the walrus population of Southampton Island will be reassessed. A survey of marine mammals, particularly white whales and narwhales will also be carried out in Barrow Strait and Lancaster Sound and at Repulse Bay.

The marine ecology study in the Mackenzie area will be increased in scope as a result of special funds provided for research on the Mackenzie Valley pipeline. A series of oceanographic stations running from close inshore out to the 200m contour will be carried out from the schooner *North Star* in August. The C.S.S. *Parizeau* will also provide facilities for sampling planktonic fish larvae in Amundsen Gulf. Physiological experiments on important species of plankton and benthos will be initiated and the effects of oil on these forms, as well as on bacteria, will be assessed.

A limited program on the marine ecology of Frobisher Bay will be carried out from M.V. *Calanus*.

Freshwater Institute, Winnipeg

Responsibilities

Investigation of the freshwaters of the Northwest Territories, with emphasis on fisheries and the aquatic environment.

Long-term Plans

- An assessment of the aquatic ecology of the Mackenzie River and selected areas in the Porcupine River drainage; an investigation of the present ecological factors controlling the diversity and abundance of bottom organisms in rivers and lakes; predictions concerning the ecological effect of increased silt load and oil spills on Mackenzie and Porcupine valley watersheds in relation to the construction, operation and maintenance of proposed highways, and gas and oil pipelines.
- Measurement of the productivity of fish stocks in northern waters and the influence of harvesting methods on productivity.
- A limnological survey of the Yellowknife area with emphasis on the effect of mine wastes (largely arsenic) on aquatic ecosystems.

Review of 1972 Operations

- A limited winter program was initiated in 1971/72; the open-water operation began in May 1972. Yellowknife was the field HQ, with field bases at Fort Simpson, Inuvik and Old Crow. A shared (FRB/FSO) four-trailer complex was set up at Fort Simpson and a single trailer located in Inuvik. Parcoll buildings were set up initially at Old Crow and later relocated on Caribou Bar Creek, Yukon Territory.
- Habitats which had been subjected to disturbance (both natural and artificial) were subjected to intensive study to assess the effect of future pipeline and highway development. These included a natural mudslide and highway crossings of rivers. Experimental oil spills were made on a flowing water system in Yukon Territory, and a lake in the Mackenzie delta. The initial effects of these spills were assessed and long-term monitoring initiated.
- The measurement of rates of erosion and silt-transport within the watersheds under study was continued. The relationship between these parameters and the distribution and abundance of zoobenthos was studied.
- Research on the fish populations and general limnology of four lakes near Yellowknife selected for an experimental fishery was continued. Abundance, growth rates, feeding habits, reproduction and mortality of fish stocks in their unexploited state, abundance and composition of planktonic and benthic organisms were measured. A field camp was constructed at one of the lakes and research carried out from this base.
- The limnological survey of lakes in the Yellowknife area was completed and an intensive study of the biological and chemical cycling of arsenic in these lakes was begun.

Plans for 1973

- To continue the intensive study of disturbed areas and extend it to include another highway crossing. The experimental oil spills will be monitored to assess long-term effects and recovery rates of the systems. Further studies of invertebrate life cycles and insect-rearing projects are planned and a study of four lakes in the Old Crow flats will be initiated. Rates of erosion and silt transport in the

Mackenzie and Porcupine systems will continue to be monitored as will the study of the biogeochemistry of arsenic in Yellowknife lakes.

- Fish will be harvested at different rates from three of the four experimental lakes near Yellowknife, while the fourth will be kept as an unharvested control. Measurements of growth, reproduction and mortality will continue in all four lakes. The relationship between whitefish and their food supply will be examined in some detail.
- Arctic char streams in the vicinity of Cambridge Bay will be surveyed with a view to selecting sites for more detailed research and developing a scheme for predicting the likelihood and extent of char which will use a stream based on easily observable features of the stream.

LANDS, FORESTS AND WILDLIFE SERVICE

Lands Directorate

Responsibilities

To supply and analyze data for land-based renewable resource inventories, regional planning and the assessment of resource development impacts.

Long-term Plans

Long-term plans for the Lands Directorate reflect its association with the Department of the Environment. Emphasis will be placed on studies and plans of land resources in co-operation with other agencies and agencies. A proposal has been submitted to begin a long-term integrated survey of the physical land resources in the North in

Review of 1972 Operations

Land Use Planning Branch

In conjunction with the ALUR Program of IAND, forty-four Land Use Information Series maps covering the Mackenzie Valley and northern Yukon were published in the summer of 1972. The maps, produced at a scale of 1:250,000 (1 inch to 4 miles), integrate a wide range of data on renewable resources and related activities. Each map is complete with a detailed legend and the series includes information on: critical wildlife areas; fish resources; hunting; fishing; recreation and tourism potential; important hunting and trapping facilities; important hunting and trapping

notes on communities; development and control zones; the location of meteoric and water quality stations; geological and historical sites; proposed P. reserves; and parks and sanctuaries. In early 1972 the series was extended to include 23 maps of the south, central, and northern Yukon. Field studies were undertaken by the Canadian Wildlife Service, the Forest Service and the Lands Directorate to generate data for the program. The maps are being compiled and drafted by the Lands Directorate and should be published during the summer of 1973.

Land Evaluation and Mapping Branch

As part of the Land Use Information Series an inventory of outdoor recreation potential was carried out in the 23 maps referred to above.

During 1972, in connection with the Environmental Impact Assessment Program — Mackenzie Highway — assistance was given in co-ordinating Department of the Environment inputs, and in developing procedures and requirements for environmental acquisition and assessment. This information served as a basis for evaluating and reviewing those phases of the Mackenzie Highway Project initiated or undertaken in 1972.

Plans for 1973

All the above programs will continue in 1973. The Land Use Information Series will be extended to cover 17 maps in the Mackenzie and Selwyn Mountains region, to be published in 1974.

A proposal has been submitted for the undertaking of pilot project studies for an integrated survey of biophysical land resources as part of preliminary reconnaissance studies for the Arctic Islands Pipeline Project.

Canadian Forestry Service

Responsibilities

To conduct forest insect and disease surveys; to prepare forest inventories and maps of forest and other vegetation.

To advise and assist the Department of Indian and Northern Affairs on forestry operations, practices and staff training.

To conduct ecological research in the north.

To participate in the conduct of environmental impact assessments of major industrial developments.

- To compile national statistics on forest stocking, growth and depletion and annual fire losses.

Long-term Plans

Owing to the new responsibilities of the Department of Environment and the increasing pressure of industrial activity, the Canadian Forestry Service plans call for increased emphasis on participation in biophysical surveys, ecosystem studies, ecological studies of the impact of land use on environmental quality as well as continued assistance and research in forest management, especially fire detection and control.

Review of 1972 Operations

General

Routine operations were continued in the forest insect and disease survey and in the compilation of national forestry statistics.

A variety of services was performed for the Yukon and Mackenzie forest services. A problem analysis of forest regeneration needs and nursery requirements for the Yukon was made. Regeneration surveys and evaluation of planting trials were conducted in the Yukon and Mackenzie districts.

In forest fire control, tests of the use of helicopters and various fire retardants were conducted and airdrop specifications formulated. Assistance was given in planning air tanker operations and other suppression techniques. A safe, effective incendiary system was devised for the Yukon Forest Service for use in helicopters for back-firing and burn-out operations in ongoing fires. A fire detection system was devised for both districts. A series of lectures are given annually at the Yukon Fire Fighting School.

Plans for 1973

Assistance to the two northern forest services in problems of forest regeneration, fire control, insects and disease, and staff training will continue.

Canadian Wildlife Service

Responsibilities

- Surveys and inventories of wildlife resources; conducting research on wildlife species in relation to their habitat; collection and analysis of animal population and utilization data; recommending management procedures for particular species of economic importance; research,

management, and administration of migratory birds under the Migratory Birds Convention Act; co-ordination of federal, provincial, and territorial action on common wildlife problems, including caribou research and management; studies on wildlife disease and pollution.

Long-term Plans

- To continue studies of major wildlife resources; to extend research to less-known species; to establish more suitable research facilities in the field; to assess the success of managing wildlife resources to date, and the potential success for the future.

Review of 1972 Operations

Mammalogy projects

The Research project on Dall sheep in the Mackenzie Mountains was continued with intensive field studies on the biology and health status of the sheep. The research study in the Mackenzie Mountain area, in zones 12 and 19 included studies on woodland caribou with emphasis on their seasonal movements and utilization by Indians.

Studies of bison in the Northwest Territories and Wood Buffalo National Park were continued with emphasis on anthrax vaccination and surveillance. An outbreak of anthrax did not occur in this area during 1972.

The study of the Southampton Island caribou range, begun in 1970, has been concluded and preliminary reports are being prepared. Caribou range studies in northern Saskatchewan and northern Manitoba were continued in 1972.

Studies on the Porcupine population of caribou in the Yukon and Alaska and a preliminary inventory of the Peary Caribou on Melville Island in the Northwest Territories was begun.

The Porcupine caribou studies are being co-ordinated through an international committee comprised of representatives of the Alaska government, the Canadian Wildlife Service and the Northwest and Yukon Territorial governments. The preliminary examination of the muskoxen range on Ellesmere Island was continued in 1972 in addition to total numbers and productivity of muskoxen on Melville and other High Arctic Islands.

The study of the reindeer herd in the reindeer preserve on the Mackenzie Delta was concluded in 1972 although the final

reports have not yet been written. Negotiations are now beginning with the Department of Indian and Northern Affairs for the transfer of responsibility of the herd.

Polar Bear research continued with the emphasis on identifying the ranges of discrete sub-populations. Studies also involved documenting major denning sites and the relationship between bears and their major food supply, the seal.

Environmental studies projects

An ecological evaluation of new and proposed national parks in the Northwest Territories and Yukon Territory was continued in 1972 in connection with the National and Historic Parks Branch of the Department of Indian and Northern Affairs. The largest input in 1972 was on the Kluane National Park in the Yukon Territory.

Examination of arctic resource sites, both active and inactive, was continued on the Queen Elizabeth Islands as part of the monitoring project begun in 1970. Extensive use of aerial photography was continued to document long-term effects of oil exploration and mining activities on the northern environment.

Ornithology projects

A survey of the more populated breeding areas of snow geese in the Queen Elizabeth Islands was carried out in conjunction with the Quebec Wildlife Service. An attempt was made to develop an accurate aerial census technique for less extensive snow goose populations at seven major colonies in the Hudson Bay drainage. No breeding was possible at three of the large northern colonies because of a delay in snow melt.

Studies under contract of nutrition, physiology and genetics of lesser snow geese continued at McConnell River and La Pérouse Bay on the west coast of Hudson Bay.

Investigations of sea bird colonies were initiated in the Lancaster Sound region of the Queen Elizabeth Islands and also along the southeast coast of Baffin Island.

Studies continued on Whistling Swans in the Mackenzie Delta as well as the distribution of birds in the Beaufort Sea.

No pick-up of eggs of Whooping Cranes occurred in 1972 but surveillance of breeding birds in Wood Buffalo National Park was continued.

Plans for 1973

Ornithology

A continuation of programs started in 1972 or earlier with emphasis on measuring the impact of an apparent climatic deterioration in the Arctic.

Studies will begin on the population ecology of raptorial birds in the High Arctic.

Mammalogy

Studies of the forested winter range of barren-ground caribou in northern Manitoba, Saskatchewan and the Northwest Territories will continue. Emphasis will be placed on determining the long-term effects of forest fires on winter range.

Further aerial surveys of caribou and muskoxen are planned for Melville Island to determine seasonal distribution, productivity and total numbers. The use of radio telemetry will be attempted to document the extent of interisland movement by both species. A food habit study of muskoxen and Peary Caribou will begin in the summer of 1973 on Axel Heiberg Island. Muskoxen studies supported by the Canadian Wildlife Service on Devon Island will be oriented to total energy flow and herd behaviour. The use of aerial photography will be initiated to obtain counts and sex and age structure of caribou and muskoxen herds and to classify range types and habitat productivity.

Polar bear field research will continue in the Western and High Arctic, and in the James Bay region. Preliminary studies will begin in several new areas with highest priority attached to areas with increased shipping, having a high likelihood of pipeline development, or undergoing mineral or hydro development. Physiological studies of penned bears, bears in summer dens, and bears in winter dens will begin in the Cape Churchill area.

Woodland caribou studies in the Mackenzie Mountain area, zones 12 and 19, will be continued. A study of grizzly bear population dynamics and biology will begin on the Yukon north slope. A preliminary study of barren-ground caribou distribution, numbers, and productivity will begin north of Great Bear Lake.

Environmental studies projects

The ecological evaluation of new and proposed National Parks in the Northwest Territories will be continued in conjunction with the National and Historic Parks Branch, Indian Affairs and Northern Development.

The extensive ecological monitoring of resource activity in the High Arctic will be

replaced by more intensive studies of the relationships between the wildlife and its habitat. The most suitable methods of sampling arctic vegetation will be investigated as well as testing techniques for determining annual forage production of different habitat types.

WATER MANAGEMENT SERVICE

Inland Waters Directorate

Water Resources Branch

Hydrology Research Division

Responsibilities

To conduct federal research programs in hydrology with emphasis on the development of hydrologic techniques and methodologies for water resource evaluation and management; to identify those operational areas in the water resource field where there are needs for research and to implement appropriate research projects and/or programs to meet these needs; to develop and improve hydrologic models and to establish firm objective criteria for assessing their reliability; and, to gain a better understanding of hydrologic processes and interactions in order to place modelling on a more deterministic basis.

Long-term Plans

A continuing commitment to investigation of northern hydrologic and hydrologic problems is envisaged. The aim of investigations is to gain a fuller appreciation of northern conditions as they relate to development of water resources and to environmental implications.

Review of 1972 Operations

A program initiated in 1972 to evaluate ground water and permafrost conditions in the Mackenzie River Valley was expanded to include identification of the principal regions of groundwater recharge and discharge, rates of groundwater movement and the hydrogeological implications of northern oil and gas pipeline development. Investigations initiated in 1972 included study of river icings in the Porcupine River and Beaufort Sea drainage basins in the northern Yukon and an inventory of springs in northern British Columbia and the Yukon.

Plans for 1973

Groundwater investigations in the Mackenzie River Valley and Yukon will be intensified. Increased emphasis will be placed on the hydrodynamics of water circulation in permafrost, the thermal effects on groundwater flow and thermal perturbances on permafrost configuration, the development of groundwater instrumentation for use under northern conditions.

Hydrology Division

Responsibilities

To establish a federal research centre to provide leadership in the study of glaciology; to develop new concepts on the hydrologic processes in the North; to study the structure and physical properties of snow cover and their relationships with the environment; to develop computerized data storage and retrieval systems pertaining to projects for federal, provincial and territorial resources agencies, educational institutions and industrial concerns; to support the International Hydrological Decade (I.H.D.) projects.

Short-term Plans

To develop a project that focuses on the hydrologic regime of basins in an environment characterized by permafrost, low temperatures, extensive periods of ice cover, increased attention will be given to a study of calving glaciers and the rate at which they produce icebergs. Observations on Arctic basins selected under the program will continue. Special attention will be given to the hydrologic conditions of economic development.

Review of 1972 Operations

Mass balance studies on I.H.D. basins continued during the summer. A study of the calving process of Leffert Glacier, Ellesmere Island, was completed successfully, and photogrammetric studies of these glaciers were continued. Work on the glacier inventory continued, by staff in Ottawa and through a contract with the Arctic Institute of North America. A team participated in the ground truthing of the remote-sensing program of the Arctic Ice Dynamics Joint Experiment (AIDJEX).

Plans for 1973

The mass balance studies on the I.H.D. basins in the Arctic will continue, as will work on the glacier inventory.

A team set up a survey network on Fletcher's Ice Island (T3) and, using a laser interferometer, will determine the radial spreading of the island.

In 1973 increasing emphasis will be placed on the accumulation of river scour and fill data, on the physical limnology of lakes along pipeline routes; and on storm surge levels along the Mackenzie delta coast.

Water Survey of Canada

Responsibilities

The Water Survey of Canada (WSC) is primarily responsible for the collection, computation, and publication of surface water data, including sediment data, for most of Canada. The Division works in co-operation with provincial governments and other departments of the federal government. In addition to operating a network of hydrometric gauging stations, the W.S.C. co-operates with other divisions of the Inland Waters Directorate in the collection of water samples for quality analysis and the operation of observation wells for groundwater studies. It also constructs, operates, and maintains water level recording stations to provide information on tides and water levels for the Marine Sciences Directorate. The W.S.C. operates laboratories for suspended sediment and bedload samples.

Long-term Plans

Co-operation and consultation with the Department of Indian Affairs and Northern Development and the various engineering studies of the changes required in the hydrometric network will assist in planning of future water resource surveys in the Territories. The W.S.C., through arrangements with the Marine Sciences Directorate, other divisions of Inland Waters Directorate and other departments, will continue to observe water levels for tidal and navigational purposes, water quality and groundwater levels.

Review of 1972 Operations

The W.S.C. constructed 11 new gauging stations to obtain flow and sediment data. Two catamarans to be used for river surveys were delivered and placed in service. Sediment sampling was started at 10 stations along the Mackenzie.

A sediment laboratory was established at Hay River and placed in operation. Sub-offices were established at Inuvik, Fort Simpson and Norman Wells. Trailer accommodation was located at Wrigley and Arctic Red River for use by summer personnel.

Thirty-seven hydrometric gauging stations were operated in the Yukon Territory and 63 in the Northwest Territories; tidal water levels were recorded at an additional 13 stations. Sediment observations were made at 7 stations and water quality samples were collected at approximately 50. Snow surveys were made for the eleventh year at 11 locations to assist in the prediction of seasonal run-off in the Taltson River basin, where hydro-electric power is generated.

Plans for 1973

Plans are to continue the established hydrometric program and expand the sediment program by including sediment measurements at 4 stations. Streamflow and water level information will also be required to support studies for right-of-way location of the Mackenzie highway.

A reconnaissance survey and installation of a streamflow gauge is planned on Ellesmere Island.

Applied Hydrology Division

Responsibilities

The main responsibility of the Applied Hydrology Division is to provide technical support for the operation of the Water Survey of Canada and includes the following functions:

- Development of techniques, instrumentation and standards for the collection of streamflow, water level and sediment data.
- Development of techniques, instrumentation and standards, including computer programming for office procedures in handling the data and publication of the resultant records.
- Conduct of Network Planning and Flow Forecasting studies.
- Conduct of special purpose or non-routine field surveys including discharge measurements of large rivers, survey of sediment deposition in reservoirs, photogrammetric surveys of glaciers and morphological studies of river basins and estuaries.

Long-term Plans

To continue experimentation and studies to further enhance the effectiveness of the Water Survey of Canada.

Review of 1972 Operations

In addition to the annual publication, a publication summarizing all streamflow data collected in the Yukon territories and Northwest Territories was printed and disseminated, listing all daily streamflow and water levels observed during 1971. All this information is available on magnetic tape for computer use. A publication listing daily records of sediment loads in many streams throughout Canada for the year 1968 was also produced.

Hydrometric Network planning for all regions including the Territories continued. A so-called square-grid file on magnetic tape which combines physiographic, hydrologic and climatologic data was established and should facilitate hydrologic studies in the future.

The biennial survey on the Nadahini glacier in northern B.C. near the Yukon boundary was conducted in August.

An experiment is under way to determine the feasibility of transmitting water level data from remote gauging stations to Water Resources Branch offices via the ERTS 1 polar-orbiting satellite. Three transmitter platforms were established, two on the Mackenzie River and one on the Kazan River in the Keewatin District. Preliminary results indicate promising possibilities.

Plans for 1973

No significant changes to the 1972 program are planned for 1973.

Water Quality Branch

Responsibilities

The Water Quality Branch is primarily responsible for the collection, analysis, interpretation and dissemination of surface water quality data. Water quality monitoring in the Yukon Territory and the Northwest Territories is conducted at 55 water sampling stations. The objectives of the monitoring program are: to obtain base-line water quality data for industrial, municipal, and private use and to provide data to assist management in the establishment of water quality standards; to study water quality trends with a view to designing methods or models for forecasting water quality conditions; and to support IHD activities.

Support of special projects carried out by the Department of Indian Affairs and Northern Development which conducts pollution surveillance surveys to assess the effect of mine waste-waters on surface waters; the interdepartmental Mackenzie pipeline study; analytical support to other federal agencies as required.

Long-term Plans

Future expansion of the water quality monitoring programs will be implemented through co-operation and consultation with the Department of Indian Affairs and Northern Development. Current plans are to expand the water quality monitoring stations to 130 by the end of 1974.

Review of 1972 Operations

A total of 894 water samples were analyzed for various projects. The particular projects and the number of samples analyzed for each project were:

- Department of Indian Affairs and Northern Development: 152 samples were analyzed for the pollution surveillance project of the department.
- Fisheries Service: 187 samples analyzed to assist this service in Fisheries Management of the Mackenzie Basin.
- Water Resources Branch, Hydrologic Sciences Division: 84 samples were analyzed for various research projects of this division.
- Water Quality Branch: 199 samples were analyzed for the ongoing monitoring program of the branch.
- Other federal agencies: 18 samples were analyzed for other federal agencies.

Plans for 1973

The Mackenzie Pipeline Study will be continued as well as an expanded monitoring program of the Water Quality Branch. The water quality laboratory established at Hay River during the summer of 1972 will be improved to provide analytical service for water quality parameters requiring immediate analysis. Analytical support for other agencies will be continued.

Water Planning and Management Branch

Responsibilities

To co-operate in the development of programs in the northern islands and coastal waters, and to improve the quality of the

northern environment in accordance with the Canada Water Act.

Long-term Plans

Consideration of river basin planning the North under consultative committee established by the Canada Water Act.

Review of 1972 Operations

In June 1972, the Branch in co-operation with Indian Affairs and Northern Development organized a major Intergovernmental Seminar on the Mackenzie Basin. The Seminar was held in Inuvik, N.W.T. Prompted by the Northwest Territories Council's concern over future Basin developments, some 40 delegates representing departments and agencies from the various governments met to focus attention on Mackenzie and to confront problems both directly and indirectly to water resources. More specifically the objectives of the Seminar were (1) to exchange information, (2) to assess the need for joint intergovernmental action, and (3) to consider appropriate courses of action.

While many of the possible developments mentioned at the Seminar were conceptual in nature, nevertheless the interdependence of the various regions within the Basin suggested the need for exchange of information and data among the several jurisdictions. Such an exchange would better permit jurisdiction to identify its needs and priorities for additional studies within its region. The Seminar also recognized the need for collection of additional data including quality and quantity as a first priority. This should be added information on fisheries, wildlife, forestry, transportation and economic development which could affect or be dependent upon the water resources.

The Seminar arrived at a consensus for more basic data and information are needed and that future action will depend upon decisions by the leaders of the government of the several jurisdictions. Because priorities and priorities will be factors, some possible procedures were listed. In addition it was recommended that the background papers presented at the Seminar be prepared for public release.

After due consideration, the alternative agreed upon was the establishment of an intergovernmental liaison committee of the Mackenzie Basin. Membership and territorial reference were agreed upon, and the final meeting of the Mackenzie Basin Intergovernmental Liaison Committee was planned for January 16, 1973 in Yellowknife, N.W.T.

The Engineering Division of the Branch appointed an engineer to act as an adviser to the Mackenzie Highway Environmental Working Group which reviews and approves consultants' reports on highway layout and design. The Engineering Adviser also chairs a hydraulic design assessment committee appointed to assess the adequacy of culvert installations proposed by consultants. Hydraulic and hydrologic investigations involved in this work are being carried out within the Division with assistance from the Water Resources Branch.

The Engineering Division of the Branch made progress during the year on hydrographic studies to investigate effects on flows of Slave River and water level stages in Great Slave Lake of various existing and proposed dams and control structures on the Slave River and its tributaries. The Division also initiated an investigation of the hydrology of the Mackenzie River basin.

Participation for 1973

Participation in field investigation team the Mackenzie Highway and the drafting criteria for northern road construction.

Physical Sciences Directorate

Responsibilities

To carry out hydrographic and oceanographic surveys and studies in Arctic waters. To produce and distribute nautical charts, sailing directions, tide tables and reports based on survey activities and other sources.

To carry out physical and chemical studies of the Arctic marine environment to determine the circulation, wave regimes, tidal characteristics, properties and distribution of ice; and to develop mathematical simulation models on the behaviour and movements of ice and pollutants in the Arctic archipelago.

Long-term Plans

To complete standard hydrographic surveys of the Arctic coasts as soon as possible and to continue the publication and maintenance of up-to-date nautical charts on the region. To carry out reconnaissance surveys when it is necessary to chart ahead of the regular surveys. To maintain reliable sailing directions as published in the *Pilot of Arctic Canada*. To publish tide tables to meet the needs of northern navigation and to carry out research to enhance our knowledge of tides in northern waters.

- To gather and interpret chemical and physical oceanographic data for a study of the environmental conditions and properties and the dynamic processes that effect the distribution of potential pollutants; and the advection and mixing of Arctic waters.

Review of 1972 Operations

In 1972 a large part of the resources of the Canadian Hydrographic Service was assigned to northern survey operations.

In March and April, a team comprised of Canadian hydrographers, a Danish naval officer and a geodesist from the Danish Geodetic Institute, supported by the Polar Continental Shelf Project, established horizontal control in Kennedy Channel, Kane Basin and Smith Sound, between Ellesmere Island and Greenland. This project was in preparation for a joint Canadian-Danish multidisciplinary program planned for this area in 1974. The horizontal control will also be used to prepare suitable shoreline plots for the Territorial Waters Unit negotiation with Danish authorities on boundary lines.

Upon completion of the horizontal control project in Ellesmere Island and Greenland, the hydrographic group, which was supported by helicopters and equipped with special equipment for sounding through ice, moved to Eureka Sound where they carried out reconnaissance surveys in Mokka and Depot Fiords. The data obtained in these surveys was for the benefit of commercial vessels carrying drilling equipment and supplies.

This group also expanded horizontal control in Norwegian Bay, and in addition established electrical centres in the Beaufort Sea which were used for a proposed 1973 multidisciplinary survey by CSS *Baffin* and by CSS *Parizeau* in its Western Arctic operations in Jones Sound.

CSS *Parizeau*, based in Victoria, B.C., was again scheduled for the Western Arctic. *Parizeau* reached the Beaufort Sea toward the end of July and continued eastward from the area completed in 1971. Systematic detailed surveys were carried out between the eastern end of the Tuktoyaktuk Peninsula and the Baillie Islands. In addition, a large scale survey at Sachs Harbour, Banks Island, and a reconnaissance survey of Harrowby Bay was completed.

Upon termination of the hydrographic project, *Parizeau* was used by geologists from Energy, Mines and Resources for

marine geology studies in the Beaufort Sea.

On the Mackenzie River, a chartered vessel, manned by hydrographers from Pacific Region, undertook reconnaissance surveys in channels of the Delta, revised existing charts from Fort Simpson to Tuktoyaktuk and carried out detailed surveys from Camsell Bend to Wrigley and from Fort Good Hope to Travaillant River.

A staff officer from the Headquarters Sailing Directions Section also travelled the entire length of the Mackenzie from Hay River to Tuktoyaktuk aboard a Northern Transportation Company barge. During this field trip, detailed sailing directions information was obtained for incorporation into the *Mackenzie River Pilot*. It is planned to issue a new edition of this Pilot using a new format during 1973.

In the sub-Arctic, hydrographers from Central Region, Burlington, used the Canadian Coast Guard icebreaker *Narwhal* for work in James Bay. This project, although undertaken on short notice, was extremely successful. Detailed route surveys were made on the eastern side of the bay leading toward Fort George to Eastmain and Paint Hills Bay.

In addition, *Narwhal* undertook an oceanographic sampling program throughout the bay. Detailed sailing directions were also prepared by Central Region.

Hydrographers from the Atlantic Region were again assigned to the MOT Arctic patrol vessels. The icebreakers, however, due to increased commercial traffic and extremely poor ice conditions were unable to carry out many of the detailed programs scheduled by the Canadian Hydrographic Service. Nevertheless, as in previous years, reconnaissance track soundings used in the revision of Arctic charts were again obtained.

In 1972, four first editions of Arctic charts and one of the Mackenzie River were released. These charts are in metric format.

In 1972, the Frozen Sea Research Group conducted field operations in Cambridge Bay and Greely Fiord. In Greely Fiord, the technical problems of collecting year-round oceanographic information were successfully overcome with the design of an oceanographic sled which permitted oceanographic observations to be continued over the break-up period. The ensuing data on seasonal variation is presently being compiled into a report.

In Greely Fiord, in a summer program, automatic recording devices were installed below the ice for the measurement of tides and temperature profiles.

Plans for 1973

In 1973, *CSS Parizeau* will again operate in the Western Arctic where it is planned to undertake resource surveys in the Amundsen Gulf area.

During the winter months, a hydrographer will assist Gravity Division, Earth Physics Branch, EM&R, in a program in Amundsen Gulf and in addition, hydrographic staff from Central Region will participate in studies to determine the effect of sea-ice on propagation of electro-magnetic waves transmitted by the existing Decca Lambda chain. This project will be co-sponsored by Geodetic Survey and will have an important bearing on future accurate positioning of offshore development well platforms.

The main hydrographic group assigned to the Polar Continental Shelf project will carry out a thorough ice sounding survey of Norwegian Bay. This group will also undertake a study of the velocity of sound in the sea ice and the water column of Norwegian Bay.

On the Mackenzie River, a chartered vessel will continue to do revisory surveys. The main sounding areas will be in the Saline Island to Norman Wells section of the river and sounding will be continued north of Fort Good Hope to Pt. Separation. Again some time will be spent on reconnaissance in the delta areas and it is hoped that a start will be made on charting the Peel River.

In the Eastern Arctic, *CSS Baffin* of Atlantic Region is scheduled for multidisciplinary studies in Jones Sound and it is also planned to carry out deep water terminal studies in Goose and West Fiords at the western end of the sound. In the Arctic archipelago it is also hoped to employ an MOT icebreaker to survey routes in Norwegian Bay, Wellington Channel and Byam Channel. In addition, surveys are planned in the approaches to Little Cornwallis Island and reconnaissance surveys are programmed for d'Iberville Fiord, Maxwell Bay and shipping routes in the vicinity of Ellef Ringnes Island and Danish Strait.

In 1973, the Frozen Sea Research Group will carry out a program in d'Iberville Fiord to determine the circulation and run-off to investigate Arctic Fiord flushing mechanisms and their application to pollutant disposal.

The laboratory investigation into the freezing point of sea water and its variation with pressure, is being concluded.

In 1973, studies will also be undertaken to support the AIDJEX program.

Oceanographic programs are also planned in Jones and Lancaster Sounds in conjunction with DREP. In areas of projected

pipeline application, a program has been prepared to investigate sea bed currents and the existence of ice scour.

In James Bay, a continuation of the 1972 oceanographic program is planned in conjunction with the hydrographic project aboard *CCGS Narwhal*.

Using *CSS Parizeau*, marine geologists will again undertake a geological program on the Beaufort Sea.

ENVIRONMENTAL PROTECTION SERVICE

Air Pollution Control Directorate

Responsibilities

- To exercise responsibility under the recently proclaimed federal Clean Air Act, Section 10-18, for all activities involving federal works, businesses and undertakings in the Northwest Territories and Yukon Territory.
- To exercise responsibility under this Act for public safety regarding air pollutants that might be significant danger to health.

Long-term Plans

Long-term plans include the staffing of EPS district offices in the North with air pollution control engineers and technicians to take action in accordance with the Clean Air Act.

Review of 1972 Operations

In 1972 the National Inventory of Air Pollutant Emissions was completed. This inventory included emissions in the two territories of the five main air pollutants namely particulates, sulphur dioxide, carbon monoxide, hydrocarbons, and nitrogen oxides. Appropriate northern agencies were informed of the objectives of the Clean Air Act. Attention was focused on the assessment of air pollution from federal facilities and installations, and pollution from the Yellowknife gold smelting operations with respect to arsenic air emissions. A National Inventory of Four Hazardous Pollutants has been initiated which will include the two territories. These four pollutants are lead, mercury, asbestos, and beryllium. An inventory of local fuel sales was conducted to make a forecast of air pollution from fuel combustion. An assessment of air pollution from incinerators and heating plants associated with work camps in the

Mackenzie Valley pipeline project was completed.

Plans for 1973

To intensify operations begun in 1972 including completion of the Inventory of Hazardous Pollutants, the staffing of EPS district offices in Yellowknife and Whitehorse will be extended to include air pollution technicians. The expansion of the National Air Pollution Surveillance Network to include both Yellowknife and Whitehorse in regard to suspended particulates and sulphur dioxide monitoring is also planned for 1973. At the request of National Health and Welfare, surveillance of arsenic air emissions will be coordinated at Yellowknife.

Ecological Protection Branch

Responsibilities

- To co-ordinate for specific projects the activities of separate missions in assessing the environmental effects of industrial exploitation of resources.
- To assess the environmental effects of activities of government and private industry and recommend environmental control actions.
- To make available information which help authorities make decisions based on professional expertise.
- Surveillance of environmental effects to construction and operation of federal projects.
- Development of codes of good practice guidelines and regulations.

Long-term Plans

- Participate in environmental study groups as necessary to fulfill the Ecological Protection Branch's responsibilities.
- Ensure compliance with standards recommended for the protection of the environment.
- Acquire base-line data for comparison pre- and post-construction periods.
- Surveillance of artificial island construction, offshore drilling and other related activities in Northern seas.
- Surveillance of pipeline construction operation.

Review of 1972 Operations

Coordination was provided in assessing environmental effects of the proposals for offshore exploratory drilling and in developing guidelines. Map overlays depicting environmentally sensitive areas in the northern regions were developed.

Guidelines for the removal or rehabilitation of the Haines-Fairbanks pipeline were prepared for the U.S. Government and Indian Affairs and Northern Development. Assistance was provided by the National Energy Board in developing CSA Standards for gas pipeline design, construction, operation and maintenance.

Plans for 1973

The Branch will participate in further initiation of the study needs, their implementation and evaluation in developing guidelines and controls for offshore hydrocarbon exploration.

Assistance will be provided in the statement of ecological protection conditions for developmental projects and activities such as roads, pipelines, airports, dams, surface mines, and campsites.

Ecological protection requirements for federal programs in the North will be assessed and surveillance requirements established in cooperation with other government departments.

Federal Activities Protection Branch

Responsibilities

In consultation with other federal departments, crown corporations and the territorial governments, to develop a clean-up program, assess environmental problems, determine courses of action, recommend annual government wide priorities to Treasury Board for allocation of clean-up funds to other departments, provide environmental engineering service and advice and ensure implementation of remedial measures for environmental problems attributable to federal activities and installations.

In co-operation with other federal departments, agencies, crown corporations and the territorial governments, to ensure all proposed new federal activities and installations incorporate and maintain effective provisions for environmental protection by instituting systems for: screening proposed projects for potential adverse environmental effects; registration of screening decisions concerning all new projects; provision of

environmental engineering and other technological services, assistance and advice; and the conduct of monitoring and surveillance of the on-going operation of installed environmental protection systems and prescribed practices.

On request to provide technical advice on the environment to the governments of the Northwest Territories and the Yukon Territory.

To establish and maintain communications with the officials and agencies of two territorial governments, other federal departments, agencies and crown corporations with which the branch deals.

Long-term Plans

Long-term plans are intended to ensure that all federal activities and installations function in a manner consistent with a role of leadership in environmental protection and that they are in compliance with standards, guidelines and codes of good practice with respect to protection of the environment. Efforts will continue to be directed towards solving the unique environmental problems in the north that are associated with federal activities. Special emphasis will be placed on applying new technology to reduce environmental degradation to lowest extent possible in order for the federal government to demonstrate leadership in the field of environmental protection.

Review of 1972 Operations

The federal government undertook in 1972 a program for the clean-up of existing environmental problems attributable to federal activities. A central fund was provided from which allocations would be made in accordance with recommendations which the Department of Environment would develop in consultation with other departments. A sum of six million dollars for all of Canada was reserved for 1973-74. Recommendations to Treasury Board include proposals for bio-engineering assessments and detailed designs for a number of projects in the North for which construction will be undertaken in 1974-75.

Under this program the Department of Environment, in consultation with other departments, is developing a screening system by which all proposed new activities will be evaluated for environmental protection implications. All screening decisions must be registered. Those having potential for significant threat to the environment are

referred to the Department of the Environment to ensure that adequate protective measures are developed and implemented for the prevention of environmental degradation.

During the Fall of 1972, district offices of Environmental Protection Service were established at Yellowknife and at Whitehorse which report to regional offices at Edmonton and Vancouver respectively. These offices will include provision for liaison, engineering and other technological service and advice respecting federal activities within the territories. Technical assistance was provided to federal departments, crown corporations and agencies in the identification, assessment, and implementation of remedial measures concerning environmental problems associated with federal activities.

Considerable emphasis was also placed on waste water handling, collection and disposal of solid wastes and treatment systems applicable to the northern federal installations. Plans have been finalized and equipment is being purchased for the assessment of low water use and recirculating toilets to be used in conjunction with an incinerator. The pilot operation will be carried out at a work camp near Fort Simpson in conjunction with the Department of Indian Affairs and Northern Development and the Department of Public Works. In addition, a study will be performed on an independent physical-chemical treatment system and on a small "package" unit which utilizes the rotating biological surface concept. Results of such studies will provide valuable information in determining the most suitable waste water treatment methods for northern federal installations.

Plans for 1973

Activities related to clean-up and prevention of environmental problems will be continued with additional emphasis on the review and assessment of new projects undertaken by the federal government. Surveillance of existing environmental control facilities will be continued with stress placed on optimum operation of the facilities.

Studies initiated in 1972 to determine the most suitable methods of waste handling, treatment and disposal in the North will be continued.

Guidelines and codes of good practice, based on the best practicable technology, will be developed to minimize adverse environmental effects associated with federal

activities in the North. Guidelines for environmental protection in federal programs involving campsites, airports, and townsites are in preparation.

Water Pollution Control Directorate

Responsibilities

- To co-ordinate EPS programs with the Department of Indian Affairs and Northern Development and two Territorial Water Boards, and to implement water quality programs in the North.
- To carry out water quality management projects under the Canada Water Act.
- To implement water pollution abatement programs, including those covered by national effluent regulations under the amended Fisheries Act.

Long-term Plans

Metal mining industries

The directorate hopes to complete its biological and engineering survey of the mines in the Northwest Territories, and begin a new survey on mines in the Yukon Territory. A base-line survey will be conducted on the site of the new mine on the Nahanni River, and waste treatment plans and specifications will be reviewed and approved with other federal department missions in the two mines in the Northern Territories. Negotiations with mines in the Northwest Territories on pollution treatment will be concluded.

By the fall of 1974 the directorate also hopes to receive assurance of the enforcement of effective anti-pollution measures from all mines in the Northwest Territories.

Future plans also include the inspection of all waste treatment facilities under construction, completion of the investigation of mines in the Yukon Territory, and the beginning of a regular monitoring of mine effluents.

Oil and gas wells

The directorate is interested in identifying pollutants and their effects on receiving water, and in negotiating with industry for a common plan of action for the clean-up and preservation of the environment. Its objectives include preventing pollution due to well-process materials entering water.

Plans to meet the objectives are: to conduct surveys on the extent of pollution,

to inspect well sites, examine waste effluents and the treatment and process conditions under which they are produced, to evaluate the effect of wastes on the receiving water, to conduct toxicity tests on drilling chemicals and muds, to consult with EPS headquarters in establishing at the federal level effective effluent regulations for well operations, to demonstrate the best treatment technology and methods, to advise industry on suitable treatment methods, to monitor well sites, and to persuade companies to recover and re-use waste materials.

Due to the large number of wells, the number of individual companies involved and resources to be protected, and the complexity and lack of knowledge about the problems involved, it would be unrealistic to schedule precise target dates for carrying out these measures.

Basin studies

The objectives of this directorate are to determine the number of pollution sources, and the effects of pollutants on the basins to be studied. The studies conducted in co-operation with the Fisheries Research Board in the Mackenzie basin will be continued, and might be finished by 1974. The directorate also plans to conduct a survey of pollution sources on the Mackenzie River and delta. Negotiations will be held with towns and industries along the river to curb their discharges of waste.

After 1974 the directorate might conduct basin studies on sources of pollution on the Great Slave Lake.

Review of 1972 Operations

Biological and engineering surveys of several metal mines was conducted to determine the extent of water pollution from these operations.

A program for assessing water pollution due to the use and disposal of drilling fluids from exploration wells was prepared in conjunction with petroleum exploration companies and DIAND.

Plans for 1973

Biological and engineering surveys of all metal mines will be completed and negotiations for pollution abatement will begin through the Territorial Water Boards for mines surveyed in 1972. Surveillance of water pollution from new mines will begin as required.

An inventory of well sites, waste disposal and treatment methods, and toxicity tests of drilling chemicals will be undertaken.

A regular surveillance program of all domestic and industrial water pollution sources will be developed in conjunction with Territorial Water Boards.

Environmental Emergency Branch

Responsibilities

- To integrate contingency planning.
- To co-ordinate the development of environmental emergency technology.
- To co-ordinate when required, a federal response to requests for assistance resulting from environmental accidents.

Long-term Plans

Long-term plans include the development of a national contingency plan to serve as broad structure, and within which individual contingency plans can be integrated for mutual advantage. It will also include development of better technology and training programs.

Review of 1972 Operations

Since March 1972 the first personnel have been recruited to activate a special emergency group within Environment Canada. Discussions have been held across Canada with representatives of industry and government. Discussions specific to the North were held in June 1972 with the Deputy Commissioner, NWT and other federal and territorial representatives. Arrangements are evolving for ongoing cooperation and support between the territorial government, DIAND, MOT and Environment Canada in respect of environmental emergency activities.

Plans for 1973

- To follow and further develop existing arrangements.
- To further examine technological development aspects of northern environment emergency operations.

POLICY, PLANNING AND RESEARCH SERVICE

Responsibilities

- To develop, evaluate and co-ordinate strategies, policies and programs for improving Canada's environment.

Long-term Plans

To fulfill the above responsibilities as they pertain to departmental undertakings in the North.

Review of 1972 Operations

Co-ordination of federal participation in the activities of the Inter-governmental Steering Committee on Northern Development of the Canadian Council of Resource and Environment Ministers.

Co-ordination of the Department of the Environment's representation and participation in the Advisory Committee on Northern Development.

Co-ordination of the review and evaluation of northern waters and related resources programs.

Co-ordination of federal participation in the activities of the Canada-Yukon and Canada-Northwest Territories Consultative Committees for consideration of environmental and related resources management. Present emphasis is on the Mackenzie River Basin.

MACKENZIE VALLEY PIPELINE CORRIDOR STUDIES

Environmental studies are being conducted in a corridor extending from Fort Simpson to Fort McPherson. Branches will extend from Fort McPherson west through Porcupine drainage area, northward along the west side of the Mackenzie delta, and from there westward along the Yukon River coastline. While some of the activities undertaken by Environment Canada are described in the preceding sections, the following are specific items in this respect:

Atmospheric Environment Service

Project
Mackenzie River Valley — Beaufort Sea climatological study.

Objective

To prepare a comprehensive and intensive climatological study for the Mackenzie River Valley — Beaufort Sea area to meet the needs of government and industry for high priority activities in the Arctic.

Work Done 1972

A detailed regional climatology of the Mackenzie Valley — Beaufort Sea was

completed during the year. Publication of the multicolour, two-volume study is expected by mid-1973. A study of snow cover accumulation patterns was initiated.

Plans for 1973

The 1973 investigations of snow cover accumulation patterns, although still confined to non-mountainous terrain, will consider additional landscape types and climatic regions and will attempt sequential mapping of the disappearance of snow in the spring.

A meso-scale meteorological Pilot Study at Norman Wells will assess the meteorological implications of co-locating in one area such services as airport, turbine pumping station, waste incineration, work and marshalling camps, a refinery, and expanding settlement and highway facilities

Project

Lichen damage by SO₂

Project Location

Mackenzie Valley pipeline route

Objective

To determine the maximum permissible concentrations of SO₂, for averaging times of 10 minutes, one hour, and one day, that will have no significant effect on lichens along the pipeline route.

Work Done 1972

Nil

Work Planned for 1973-1974

- 1973 — Laboratory studies to determine the interaction of sulphur dioxide concentration, exposure time, temperature and situation levels with lichen damage; and the relative sulphur dioxide sensitivity of particular lichen species.
- 1974 — Extension of 1973 studies to the field with appropriate techniques developed from experience in the laboratory.

Project

Ice Fog Studies

Objective

The determination of maximum permissible rates of water vapour released from specific installation, particularly incinerators, along the pipeline route in order to avoid local and regional ice fog problems during periods of low temperatures and light winds.

Work Done 1972

Estimation of the extent and persistence of ice fog clouds developed by incinerators of given capacities through a detailed theoretical study of water vapour emissions at low ambient temperatures, and low ambient levels of diffusing turbulence.

Work Done 1973

Extension of the study to incorporate mesometeorological features of various sites along the pipeline route.

Lands, Forests and Wildlife Service

Work Done 1972

Canadian Forestry Service

Vegetation mapping was completed on some 32,400 square miles along the proposed Mackenzie pipeline route. Reports were also completed on the relationships between the active soil layer, vegetation, landform, permafrost, and the sensitivity of terrain to disturbance, and case histories of the effects of certain past disturbances.

The service also participated in the environmental assessment teams on the Mackenzie Highway.

Canadian Wildlife Service

The Mackenzie Valley Pipeline Corridor Study was largely concluded in 1972 and preliminary reports and maps prepared. It is expected that analysis of the results will provide information on ecological constraints relating to consideration of a pipeline through the corridor.

Plans for 1973

Canadian Forestry Services

The Mackenzie Valley pipeline studies will be completed. Continued assistance will be provided to the Mackenzie Highway assessment team. The Service will participate in the reconnaissance studies for impact assessment of oil and gas developments in the Arctic islands and will probably initiate some long range ecological studies of vegetation and disturbance.

Water Management Service

Work Done 1972

Inland Waters Directorate

Research into the hydrologic aspects of northern pipeline development encompassed: measurement of extreme river

flood and ice shove levels; determination of the location and character of river ice jamming; the collection of river scour and fill data; studies of bank stability and slope failure; and the examination of hydro-climatic processes and watershed characteristics. A report made up of a summary and 14 separate research studies was submitted to the Environmental-School Committee, Northern Pipelines in December 1972.

Water Survey of Canada

In addition to its regular work in the Yukon Territory and Northwest Territories, the W.S.C. co-operated with several other government agencies on an intensive study of the effects on the Mackenzie River Valley of proposed oil and gas pipelines construction. Fluctuations in streamflow and sediment content and distribution of flow through the Mackenzie delta are important considerations in the study.

Water Quality Branch

During the 1972 season 254 water samples were collected and analyzed for the department's Pollution Surveillance Program.

Plans for 1973

The Water Planning and Management Branch will continue to act in an engineering advisory capacity to the Mackenzie Highway Environmental Working Group on the Hydraulic Design Assessment Committee. The water sampling study of the Water Quality Branch will be continued through 1973.

Environmental Protection Service

Project

Waste disposal study

Objectives

To make recommendations about waste disposal regulations. To demonstrate, if necessary, by demonstration and development that the recommended standards can be met.

Work Done 1972

Preliminary report and draft final report prepared on the treatment and disposal of wastes from Arctic and Subarctic work-camps.

Study initiated on the disposal of sewage to swamp land.

Plans for 1973

Completion of report and subsequent publication.

Completion of study on the disposal of sewage to swamp land.

Ecological Protection Branch

Objective

To co-ordinate environmental protection activities.

Work Done 1972

Membership on Mackenzie Valley Working Group developing and directing research and investigations on the environmental aspects of the project; final report due mid 1973.

Consolidation was provided of the department's recommendations on the changes in design and construction to minimize adverse environmental effects of the Mackenzie Highway construction.

Plans for 1973

The Mackenzie Valley functions outlined above will be continued.

DEPARTMENT OF EXTERNAL AFFAIRS (EA)

SCIENTIFIC RELATIONS AND ENVIRONMENTAL PROBLEMS VISION (ECS)

The Department of External Affairs is concerned with activities in the North conducted on behalf of or in co-operation with foreign governments or their agencies, including scientific or other projects, both civil and military. External Affairs is responsible for consulting with other departments about official applications for foreign scientists and explorers to carry out research in the Arctic, as well as clearances to foreign vessels including to engage in scientific research or exploration in Arctic waters. As a member of the Advisory Committee on Northern Development, the Sub-Committee on Arctic Research and other sub-committees, the department provides advice on matters involving foreign policy implications, and also has a responsibility in the negotiation of agreements with other countries arising out of activities in the Arctic. Similarly, the department has an advisory, co-ordinating and operational role in matters of international law and policy arising out of use of waters adjacent to the Canadian Arctic lands including, in particular, navigation and pollution control as well as the exploration and exploitation of the off-shore resources under these waters.

The department has a co-ordinating role in the external implications of trade and investment pertaining to the exploitation of non-energy resource commodities, and of northern transportation, communications and energy resource questions, to ensure that their northern aspects are consistent with general Canadian external policy. In addition to particular countries, the department must ensure that the northern policy aspects remain consistent with Canadian policy toward these countries. An example

of a problem related to northern development which involves both transportation and energy policy vis-a-vis another country and has important foreign policy implications, is the matter of Canada-USA energy relations.

The department also has a co-ordinating role in the field of Soviet-Canadian scientific co-operation in the Arctic, now being developed under the terms of the General Exchanges Agreement. The first meeting of Canadian and Soviet scientists took place in Moscow in February 1972. At that meeting agreement was reached to establish co-operation on a regular and long-term basis in Arctic science, research and development. A number of scientific fields were specified in which co-operation could be beneficial.

In November 1972 a group of Soviet experts came to Canada to meet with their counterparts in Ottawa. Agreement was reached on specific projects that would be undertaken, as well as on the timing on which the co-operative program should proceed.

DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT (DIAND)

INDIAN AND ESKIMO AFFAIRS PROGRAM

YUKON TERRITORY

Responsibilities — General

The Yukon has headquarters in Whitehorse with a regional director responsible to Ottawa for all programs. These programs are as follows:

- community affairs
- education (employment and relocation, adult education and vocational training)
- economic development

Community Affairs Branch

Responsibilities

To administer sections of the Indian Act that have general application to all Indians, and in particular those sections that apply to Indian reserves. With no reserves in the Yukon at present (with the exception of the Carcross area), the applicable sections of the Act are those referring to membership, band councils, management of Indian monies, estates and other related matters.

The Social Assistance Program is the full responsibility of this branch and three field officers cover the Yukon region. Social assistance is administered under the same regulations and on the same scale as applies to other residents of the Yukon.

At present the child care program is administered by the Yukon Department of Health, Welfare and Rehabilitation and is administered in accordance with the applicable territorial ordinances. All direct costs up to \$10,000 a year, including administrative costs, are charged back to the Community Affairs Branch for the care of registered Indian children.

Review of 1972 Operations

This branch participates in two types of housing program for registered Indians: the Off-Reserve Housing Program, which assists status Indians who are gainfully employed to move into established communities; and the Subsidy Housing Program where the branch constructs homes on lands set aside for Indians.

The larger program in 1972 was the Subsidy Program with 32 homes being constructed and a large housing repair program under way.

Improved water and sanitation services were implemented, with the branch sharing the cost in the case of Whitehorse water.

The Grants to Bands Program was expanded to include all bands in the Yukon. Organizational grants were given to each band whereupon they hired their own staff; the organization has been reasonably well developed through training programs. The Yukon Native Brotherhood has been very active through the field worker program which helps in providing a link between regional staff, band staff and brotherhood staff. In addition the Yukon Native Brotherhood has taken over and expanded the Community Development Program and a training course is presently under way to improve the caliber of the community development staff.

Plans for 1973

In the Community Affairs Branch, more encouragement for self-government is being extended to bands within the region. It is anticipated that the bands will take over local administration for such things as welfare, wood, garbage, etc. Periodic training sessions will be held throughout the year to encourage the autonomy of the bands.

Up to thirty new homes will be constructed through the Subsidy Housing Program. Major renovations and repairs will be under the direction of the Local Initiatives Program and Winter Works Program. To upgrade water and sanitation systems all villages an accelerated program of community involvement will be undertaken. Similarly, existing roads will be upgraded. Bands are being encouraged to express community needs and objectives in order to formulate plans for the physical and social development of their community. Such plans range to the complete relocation of Indian community from an inadequate site to a more desirable one.

Education Branch

While the Yukon Government Department of Education is responsible for the education program of all school-age children in the Territory, it is also involved in providing a variety of related services for the Indian population.

Responsibilities

The department assists the Yukon Government Department of Education in matters related to Indian student enrolment in both elementary and secondary schools. It processes applications from Indian students attending Yukon Hall, a departmentally-operated student residence at Whitehorse, and provides information and other data required on Indian students.

It also arranges boarding home care, either partial or total, for students without access to regular school services, student recommended by school authorities, and students whose parents or guardians are migratory for at least four months of the year.

The department also provides funds for students to attend educational institutions in or out of the Territory; to purchase books and supplies; and to cover tuition for approved school activities, monthly allowance and transportation and clothing expenses.

Students are given assistance in finding part-time and summer employment through public agencies and the Opportunity for Youth Program.

In isolated areas where regular students and kindergarten children require bus service, the department lets contracts for transportation services. These contracts are awarded primarily to local Indian people.

Employment and relocation services are provided to assess the skills of the Indian labour force, recommend training programs to assist in obtaining employment. The department maintains contacts with Manager, vocational training institutions, the Yukon Native Brotherhood and other inter-tribal organizations to develop and improve training facilities.

Guidance and counselling services are provided to both employees and employers to ensure mutual understanding, and counselling services are also provided to the general population in connection with the Reserve Housing Program.

The department also provides financial assistance to students attending university, technical schools or other institutions where such assistance is not available from the Yukon Territorial Government.

for 1973

In accordance with the department's policy, efforts will be made to encourage and report increased parental participation in primary and kindergarten programs and to provide appropriate counselling services to parents and students who must leave the reserve to continue their education.

There will be employment opportunities for students during the summer so that they can develop self-reliance, and mental, physical and social health. Students are encouraged to discuss their problems with their parents in order to discover appropriate solutions.

The Federal Labour Intensive Program and the Local Incentives Programs are well under way, employing a large portion of the Indian labour force.

Economic Development Branch

Responsibilities

In co-operation with the Indian people, other government agencies, private firms, organizations and individuals, to plan, organize and initiate a comprehensive economic development program to include logging, sawmilling, big-game guiding, fish guiding, handicrafts, trapping, fishing, commercial and industrial development, and to stimulate a steady growth of self-reliance and economic independence.

Long-term Plans

To promote and assist the development of economic enterprises, including small businesses and co-operatives for the Indians; to provide the supervision, managerial and training support required to establish a firm foundation for eventual economic independence in their own affairs; to improve the business relationship between financial institutions and the prospective Indian businessman, by establishing equity through the provision of grant, infrastructure and managerial assistance, where possible.

Review of 1972 Operations

Fishing

The salmon harvested by Indians yielded approximately 58,000 pounds, primarily for home consumption. Total value was \$40,600.00 up \$9,000.00 from 1971.

Big Game Outfitting

Teslin Outfitters Ltd., a new Indian corporation, successfully completed their first year's operation. Base camps were improved, new trails cut and extensive advertising undertaken. Additional equipment and horses were purchased in order to outfit two base camps in compliance with Game Branch Regulations. The operation was able to realize sufficient profit to meet the first payment of their Indian-Eskimo Economic Development Fund Loan.

Handicraft

The Yukon has its own representative on the Indian Arts and Crafts Advisory Committee. Plans to establish a fur-trading co-operative are being developed by the Yukon Native Brotherhood. This would include the development and local marketing of arts and crafts and other economic development opportunities that would fit into the co-operative structure. Assistance to elaborate long-range programs will be provided.

Financial statements for the 1972 fiscal year have not been prepared at this writing. A verbal report from the Manager, however, confirms that purchases and sales of Indian crafts are approximately the same as 1971. In 1971 gross sales were \$110,000.00 and Indian craft producers were paid \$87,000.00 for goods purchased for re-sale.

Logging and Sawmilling

Ross River Sawmill Co-op. members consented to voluntary dissolution and agreed to apply the proceeds from saleable assets to I.E.D.F. Loan outstanding.

The standing timber remaining and sawmill equipment will be leased to an independent Indian operator. The market price of lumber is showing signs of recovery indicating a possibility that a feasible operation can be considered for 1973.

Trapping

The 1972-73 fur price structure met and exceeded expectations, and this favourable economic condition has encouraged substantially greater trapping activities in the Yukon. Efforts were made last autumn to facilitate and encourage the development of a Yukon Trappers' Association and there was some success in securing a nucleus of interest. Arrangements were also made to assist in the marketing of furs directly through the fur auction sales with favourable results for the participating trappers.

Co-operatives

The Old Crow Co-operative completed a successful year under Indian management. The Indian manager resigned in October and it was necessary to locate outside replacement. The Co-op's gross income was \$161,000 of which \$4,100 was a net surplus and was returned to Co-op members as dividends. A second co-operative at Burwash was organized and registered, and a third at Dawson is under consideration. I.E.D.F. financing has been approved for both.

Indian-Eskimo Economic Development Fund Loans

In 1968 one I.E.D.F. Loan was approved to an Indian; in 1969, one, in 1971, one, and in 1972, there were seven approved and five under preparation.

Forestry

The Yukon Forest Service has proposed making arrangements for timber reserves which would be set aside for future Indian use and development. Department support has been given to two Indian groups who are operating timber skidders on a contract basis.

Land Transactions

In 1972 a Federal-Territorial Committee was set up in the Yukon to obtain the views of other federal agencies and the Yukon Indian Brotherhood for requests from individual band councils to have land reserved for residential or other purposes. Formerly there was little opportunity for direct discussions with other federal and territorial agencies, especially where large acreages of land were requested. The increasing complexity of territorial administration and its community government responsibilities make co-ordination increasingly advisable with the planning and land use programs of the territorial administration.

Business Services

During the year, one economic development officer in Whitehorse processed a total of \$80,000 in loans and \$22,500 in grants. The loans and grants issued involved equipment, expansion and working capital for native co-operative associations, assistance to one small logging firm and assistance in establishing a hairdressing salon. Total investment was \$102,500.00.

Plans for 1973

Big Game Outfitting

A fully booked hunting season is assured for 1973, using one base camp only. The second base camp will not be used until 1974, thereby giving game an opportunity to move back into the area. The main base camp at Whitefish Lake will be further upgraded to increase client comfort, and trails will be identified and cleared for easier passage. Tent frame outpost camps from the base camps are also proposed.

Kluane Park

Studies will be conducted to determine if trail riding facilities into scenic park areas from the vicinity of Kloo Lake would be feasible.

Agriculture

Assistance will be provided to develop grazing and feeding facilities for Indian-owned livestock.

Indian Arts and Crafts

Studies are continuing on ways of increasing Indian participation in Indian craft production. A comprehensive development program will be ready for appraisal early in 1973. A experimental production workshop is proposed for the Ross River Indian Band

to determine production costs, Indian participation, marketing and general socio-economic considerations.

Trapping

Fur prices are expected to remain high, and assistance in the provision of traps to Indian trappers will be continued in order to encourage the fur industry. The Yukon Trappers Association will also be encouraged to solicit a 100 per cent trapper membership of which an expected 75 to 80 per cent will be Indian.

Co-operatives

The Old Crow Co-operative will continue to receive managerial advisory monitoring by an accountant, until operating guidelines are firmly established. An Indian bookkeeper is employed by the Co-op, and financial controls are improving. This Co-op employs a manager, clerk, bookkeeper, postmaster, two weather observers, and one part-time handyman.

The Burwash Co-op. will receive managerial support during 1973 in order to establish principle operating guidelines, with a view to expanding services that would include a service station and tourist campground facilities for Kluane Park visitors.

Logging and Sawmilling

An Indian-owned company called "Liard Logging Co. Ltd." has been organized and is well into operation. A timber permit has been obtained; a sawmill is expected to be built in 1973. A market for lumber, sufficient to sustain the operation, has been identified, thus assuring reasonable security for an I.E.D.F. loan. First-year production should reach one million FBM without difficulty, resulting in approximately a \$150,000.00 manufactured wholesale product value.

Indian-Eskimo Economic Development Fund Loans

A substantial increase in requests for I.E.D.F. financing of Indian-owned businesses is expected. A 300 to 400 per cent increase over 1972 is anticipated for proposals including service stations, outpost fishing lodges, logging and sawmilling, and small general contracting equipment.

NORTHWEST TERRITORIES

Responsibilities

- To assist the registered Indian people of the Northwest Territories in social, economic and community development, in close consultation and collaboration with the Government of the Northwest Territories and individual Indian bands.
- To assist the Indian people of the Northwest Territories to optimize their participation in educational and cultural development programs.
- To assist the Indian people of the Northwest Territories in researching and presenting their Treaty settlement proposals and in achieving an effective flow of information on Indian Affairs programs and policies.
- To establish a responsive and reliable system of consultation and awareness among all federal departments operating in the Northwest Territories regarding the needs and aspirations of the Indian people, and the role that departments play in assisting the Indian people in this regard.

Long-term Plans

Within the context of current and future legislation and delegation of authority, to implement active programs that will ensure:

- development of band management capability and potential for assuming increasing responsibility for administration and control of band assets and resources;
- increased cultural and social self-awareness and pride in the heritage of Indian people and their contributions to the Canadian community as a whole;
- multi-lateral exchanges of information on government programs, and the opinions and desires of Indian people concerning these programs to ensure that their interests are served in policy and program development and implementation.

Review of 1972 Operations

The office of the regional representative was opened on August 1, 1972. Since that time it has been possible to establish operational arrangements between the territorial administration and the Indian Affairs Program in the field of Economic Development as related to the Indian Economic Development Fund. Preliminary steps towards the formation of joint consultation on

economic Development policy and programs have been taken. The result has been an increased flow of information, ideas and proposals which has produced a marked increase in general economic development activity among the Indian people.

Plans for 1973

An intensification of Indian participation in social development, economic development, and cultural revival and growth is anticipated. Active liaison/consultation and communication with Indian communities, and individuals will increase. There will be a collateral effort to assist Indian people in discussing their land rights under Treaty, and developing a proposal for presentation to the Federal Government.

PIPELINE INFORMATION — EDUCATION PROJECT

The Pipeline Information and Education Project was begun in 1972 to convey objective and credible information to people in a number of northern communities concerning the proposed gas pipeline and its likely effect on the people, the communities and the environment.

The project provides an alternative to the traditional, unilateral public information program, in the development and conduct of which native northerners were involved from the outset. In April 1972, a supervising group was formed, comprising representatives of Indian Brotherhoods of the NWT and Yukon, the NWT Metis Association, the N.W.T. Department of Local Government, and the Federal Government. The procedure developed by the supervising group was as follows:

a) a representative member of each community (and a Discussion Leader) would be employed to convey information in English and French (Loucheux or Slavey to the members of the community, b) background information on the pipeline would be prepared by the LAND Department and provided to discussion leaders subject to approval by the supervising group, c) a project manager would be hired on the recommendation of the supervising group, d) field work would be initiated by a two or three week workshop in which the discussion leaders would discuss pipeline information and related matters.

The supervising group determined that the project would be neutral re Treaties 8 and 11 and similar issues, and that the discussion leaders would have complete freedom to discuss any questions they chose and to define their own methods and procedures within the limitations of the broad objective and the \$100,000 budget available to support it.

The first workshop was held in August, after which the discussion leaders returned to their communities for a first round of information dissemination. A second workshop was held in Hay River in mid-December.

The program functioned satisfactorily during its first six months, in the sense at least that information has been conveyed by native people to native people, and the discussion leaders have begun to assume a responsible proprietary role in the conduct of the project. In February 1973, the supervising group and the department agreed that the program would be expanded to include information on the Mackenzie Highway.

NATIONAL AND HISTORIC PARKS BRANCH

National Parks Service

Responsibilities

The National Parks Service is responsible for Canada's national parks. It provides visitor services and protects natural resources. The service also examines and evaluates sites to determine their potential as national parks, recommends the establishment of new parks and plans for the development of existing parks. There are four national parks north of the 60th parallel — Wood Buffalo in the Northwest Territories and Alberta, Kluane in the Yukon, and Nahanni and Baffin Island in the Northwest Territories. The last three were announced 22 February 1972 by Jean Chrétien, Minister of Indian Affairs and Northern Development.

With the announcement of the Byways and Special Places Program in October 1972 the responsibilities of the Branch were widened to include the preservation, development and operation of new types of park including marine parks, wild river parks, national landmarks, historic waterways and historic land trails all of which may find application in the Yukon and Northwest Territories.

Long-term Plans (general)

- To undertake field studies aimed at identifying natural landscapes and environments in the North which are not yet represented in the national parks system. These studies are part of long-range planning which will make it possible to establish between 40 and 60 new national parks in Canada during the next three decades.
- To plan for the development of existing national parks through resource inventory and environmental studies.
- To study the effect of human activities in national parks, particularly those having an arctic environment and to conduct specific studies on visitor behaviour in the northern parks.
- To collaborate with other agencies responsible for outdoor recreation and tourism in the North so as to produce an integrated park system complementary to the objectives of the various agencies concerned.

Plans for 1973 (general)

- To undertake field studies of areas meriting consideration as national parks or new park units as specified in the Byways and Special Places Program.
- To propose the establishment of new park areas meriting protection under the National Parks Act.
- To advance the planning and operation of existing national parks.
- To investigate policies regarding the use and regulation of aircraft, and other means of transportation, in the National Parks established north of 60°.

Future National Park, Great Slave Lake, N.W.T.

Review of 1972 Operations

An area of 2,680 square miles around Fort Reliance on the east arm of Great Slave Lake has been set aside since March 1970 as the nucleus of a future national park. A report by the Canadian Wildlife Service on ecological surveys conducted at the request of the branch has now been completed. Discussions with the Snowdrift band continued in 1972 to ensure that, before any final decision on the proposed park is made, the views of the band would be fully considered.

Plans for 1973

No additional field studies are planned for the area in 1973. Discussions with the Indian band will continue as necessary.

Pingo Park, Tuktoyaktuk Peninsula, N.W.T.**Review of 1972 Operations**

Pingos, large dome-like structures of ice covered by a mantle of soil and vegetation, are one of the several frost phenomena which characterize northern environments. They are found occasionally in the Russian North, in Greenland and in Alaska, but they are most numerous in and around the Tuktoyaktuk Peninsula where more than 1,400 have been identified.

Field examinations of the Tuktoyaktuk peninsula, Mackenzie delta and environs were undertaken by the Canadian Wildlife Service (CWS), the International Biological Program (IBP) and the National Parks Service in 1971. A draft report on CWS studies was completed in 1972 and an IBP check-sheet providing a detailed biological inventory of Toket Point is available.

Following the initial field examinations, another planning field study was carried out in the Tuktoyaktuk peninsula by National Parks staff in 1972. Based on field data gathered, a proposal has been prepared to establish a pingo park in the vicinity of Tuktoyaktuk.

Plans for 1973

Followup action in 1973 will depend on the acceptability of the proposal.

Wild River Studies, Yukon and Northwest Territories.**Review of 1972 Operations**

Following the 1971 pilot study of wild rivers in the Yukon Territory, the scope of the 1972 study was enlarged to include rivers across the country. In all 3,300 miles of rivers were studied by 20 university students in the Yukon Territory, Northwest Territories, Alberta, Saskatchewan, Quebec, Newfoundland and Labrador.

In the barrenlands of the Northwest Territories, important exploration routes such as the Thelon and Coppermine rivers were surveyed by one crew. Another crew in the North studied the Natla, Redstone, Keele and Mountain rivers, western tributaries of the Mackenzie River that have carved valleys through the beautiful Mackenzie Mountains. This crew also examined the Firth River, in the British Mountains in the northwest corner of the Yukon Territory.

Plans for 1973

Canoe trip reports are being sent to provincial and Territorial recreation agencies for distribution to the public in time for the 1973 canoeing season. National and Historic Parks Branch planners are also examining the data and reports produced by the study in the context of the recently announced Byways and Special Places Program. The study is to be continued in 1973, but will concentrate on rivers in the provinces. When completed, the survey will provide a basis for the systematic selection of potential park areas where the central theme is a wild, scenic or historic waterway.

Wood Buffalo National Park**Review of 1972 Operations**

The capital budget for 1972-73 was \$155,000. The operations and maintenance expenditure for the year was \$583,000.

Expenditures were allocated as follows (amounts include administration, salary and wage costs):

General works	\$105,000
Resource conservation	\$350,000
Administration and general	\$ 87,500
Visitor services	\$ 40,500

In addition, fire-fighting expenses of \$478,000 were incurred during the summer of 1972. The park had 34 forest fires which burned approximately 993 acres. Due to more favourable weather and to the development of pre-suppression crew, equipment and aircraft on standby efficiency was improved in shortening delays in attacking fires and considerably reducing the fire losses and expenses of the previous year.

The bison management program continued, with increased aerial surveys. Approximately 5,000 ideally located bison were corralled at Sweetgrass Landing, resulting in more bison being vaccinated against anthrax than in any previous year. There were no anthrax outbreaks this year.

Two additional timber berths along the Peace River were eliminated following the expiry of agreements. Substantial areas of timber less than 160 years old were thus preserved allowing a good base for natural regeneration.

Plans for 1973.

The survey of bison will be continued, including a report on herd movements and pinpointing of potential sites for better and more efficient corrals. The anthrax vaccination project is planned for June. Some modifications are planned for Sweetgrass Landing

corral facilities. A new bison management and disease control program, proposed in fall of 1971, will be further developed.

Timber berth clean-up, including logging area and mill sites, will be progressing this year with plans to assist the natural regeneration of the logged and otherwise damaged areas.

Termination of a provisional master plan for the park is conditional on the settlement of Indian land claims.

Operation of the park will continue to stress improving the environment, improving staff knowledge of the park, and controlling resource extraction; such as hunting and trapping by native people and logging in timber berths.

Baffin Island National Park, N.W.T.**Review of 1972 Operations**

It was announced that the park would open in February 1972 and approximately 100 persons visited it during the summer. A representative of the National and Historic Parks Branch lived at Pangnirtung from September 1972 to organize park resources and to supervise operations. The councils of Pangnirtung and Broughton awarded contracts to identify important natural features in the park, to develop trails, and to remove debris. Resource inventories included biological surveys and archaeological research. In December training related to jobs associated with the park operation was begun for the local residents.

Plans for 1973

A task force was set up in January 1973 to prepare planning guidelines for the park. The guidelines will serve as a framework within which a provisional master plan for the park's protection and development will be drawn up. It is expected that a superintendent for the park will be appointed early in 1973. He will be responsible for employee training, overseeing visitor services and supervising other activities associated with the operation of the park.

Nahanni National Park**Review of 1972 Operations**

On 22 February 1972, Order-in-Council P.C. 1972-300 became effective, ordering the withdrawal of 1,840 square miles of land along the South Nahanni River for a national park. It contains: Virginia Falls, with a

drop, showing four acres of water face; the canyons faced with steep cliffs; and the Rabbit Kettle hot-spring, a dome-like structure of limestone precipitate which rises 100 feet from the valley floor. Accessible only by air or riverboat, the park was visited by up to 1,000 persons during the summer. A temporary administrative centre was established at Nahanni Butte where one warden was stationed.

On 6 October 1972 a seven-member planning task force was established, with responsibilities for setting out planning guidelines for the park. The task force is composed of representatives of the National Historic Parks Branch, Indian-Eskimo Economic Development Branch and the Northern Economic Development Branch. Geological studies, under the direction of D. Ford of McMaster University, commenced in 1972.

Plans for 1973

The planning task force will hold meetings in March with Territorial officials, showing which they will make their recommendations and finish their work in June. The completed planning guidelines will provide direction for a provisional master plan to be made by officers in the Prairie Divisional office in Winnipeg. Speleological studies will probably be completed in 1973. It is likely that a superintendent will be appointed early in 1973 to oversee the operation of the park. Information on outfitters servicing the area may be obtained by writing the Director, Travelarctic, Yellowknife, N.W.T.

Kluane National Park

Review of 1972 Operations

Covering 8,500 square miles, Kluane is the second largest national park in Canada. It contains Mount Logan, Canada's highest mountain; an extensive system of icefields and glaciers; and the world's largest protected bands of Dall sheep. Before the establishment of Kluane National Park by Order-in-Council P.C. 12-238, the land was part of the Kluane Game Sanctuary and the Kluane Park Reserve. During 1972 staff of the National Park Service carried out the initial studies necessary to develop a conceptual park plan and the Canadian Wildlife Service began a two-resource inventory. The first field staff have initiated operations from Haines Junction, where two Park

Wardens are concerned with the protection of the park's resources. An office to administer both Kluane National Park and the National Historic Sites in the Yukon has been opened in Whitehorse.

Plans for 1973

An inventory of resources in the park will be continued by the Canadian Wildlife Service, and a reception area for visitors will be established at the administration centre at Haines Junction. Planning guidelines for developing the park should be completed by 30 April at which time responsibility for preparing a provisional master plan for the park will be transferred to the Western regional office in Calgary.

Arctic Islands, N.W.T.

Long-range Plans

Studies are being done in the Arctic islands to identify biophysical themes and representative or unique features expressing these themes. This information will be used as a basis for selecting study areas that may warrant considerations as national parks or other park areas as specified in the Byways and Special Places Program, such as national landmarks.

Review of 1972 Operations

An aerial reconnaissance of parts of Ellesmere, Devon and Axel Heiberg islands was done in July 1972. Five areas were identified as warranting further study: Hazen Plateau-Tanquary Fiord area; Borup Fiord area; the Sawtooth Mountains area; Mokka Glacier and Skaare Fiord area; and the Truelove Lowlands. A number of these areas were also under study by the Canadian Wildlife Service, the International Biological Program, and the Terrain Sciences Section of the Geological Survey of Canada.

Plans for 1973

Detailed planning studies of the park system are contemplated in those areas identified in the 1972 studies. Further field reconnaissance work is planned for July 1973. Preliminary aerial reconnaissance studies will also be initiated in the western Arctic lowland islands as well as a followup of studies in the eastern Arctic lowlands islands undertaken in 1970.

National Historic Sites Service

Responsibilities

For a number of years the National Historic Sites Service has been engaged in a thorough study of those persons, places and

events of note in the history of the Yukon and the Northwest Territories. A number of items were recognized as being of national historic importance. These and others, which will be considered in the future, will be commemorated by the federal government with assistance where advisable, from the governments of the Yukon Territory and the Northwest Territories.

Long-term Plans

To implement, after acceptance by the Minister of Indian Affairs and Northern Development (and according to established priorities), recommendations by the Historic Sites and Monuments Board of Canada, the Minister's advisers on historic matters.

Preparations are being made for ceremonies and the unveiling of a plaque at Froebisher Bay to commemorate Sir Martin Froebisher, and at Enukso Point on Baffin Island, site of a number of Inukshuk. (Inukshuk are arrangements of stones, generally in the shape of a human body, which may have been built some 2,000 years ago.)

Plans are being considered to suitably commemorate by plaque at Herschel Island in the Yukon Territory the assertion of Canadian sovereignty in the Western Arctic, as well as of the whaling industry in that area and the intercultural at Herschel Island.

A major project will be to develop the Klondike Gold Rush International Historic Park, an important feature of which will be the joint development by Canada and the United States of the historic Chilkoot and White Pass trails from Dyea and Skagway in Alaska to Bennett in British Columbia. It is also hoped to establish a Yukon historic waterway between Dawson City and Bennett to preserve the natural and significant historical features.

The most extensive segment of the National Historic Sites Service program in the North will be at Dawson City, the focal point of the Gold Rush in 1898. The program is well in hand, the department having acquired a number of buildings which will be restored and preserved. Of particular interest are plans for period restoration of the commissioners residence, Ruby's Place, Bonanza Hotel, the post office and the exterior of the administration building.

Bennett is historically important as the point of the trek from the south where those going to the gold fields stopped after coming over the Trails of '98. The old Presbyterian church at that site will be stabilized and preserved. Exhibits will be established relating to the Trails and trek.

Review of 1972 Operations

The department acquired an ore barge at Atlin and Gold Dredge No. 12 on Dominion Creek. Title was obtained to the Dawson Daily News Building, Red Feather Saloon and the Bank of British North America building in Dawson City. Winaut's store and Harrington's store were purchased. These buildings were among the more than 40 such structures examined by the department's architectural and historical research staff. Soil tests were conducted in Dawson City to determine the most suitable type of foundation for the old buildings which are to be restored.

All members have been appointed to the Klondike Gold Rush International Historic Park Advisory Committee which met twice during the year. The committee, which is composed of two members each from Canada and the United States and one each from Alaska, British Columbia and the Yukon, was established to advise on planning and development for the Chilkoot and White Pass trails area of the proposed park. The Chilkoot Trail was patrolled over the summer to protect and record artifacts and prepare an inventory of historic resources.

Plans for 1973

The Robert Service cabin will be restored, interpreted and opened to the public. Restoration will continue on the sternwheelers *S.S. Klondike* and the *S.S. Keno*, and the former will be surveyed as will the barge at Atlin. Negotiations for the acquisition and protection of other historic buildings in Dawson City will continue.

NORTHERN ECONOMIC DEVELOPMENT
BRANCH

Oil and Mineral Division

Oil and Gas

Review of 1972 Operations

Oil and Gas Exploration

Expenditures by industry on oil and gas exploration in the Yukon Territory and the Northwest Territories exceeded \$195 million in 1972, an increase of about \$28 million over the previous year.

Surface geological, photogeological and seismic surveys by the oil industry, increased by about 10 per cent in 1972. A total of 240 seismic crew-months was reported, including

10 marine seismic surveys in the Mackenzie delta, in the Beaufort Sea, and the Baffin Bay—Davis Strait areas.

Marine seismic operators encountered severe ice conditions in the Arctic islands and most marine seismic work had to be drastically reduced. Surveys could not be done in the Sverdrup Basin marine areas, but were concentrated in Lancaster Sound and Davis Strait.

In the Beaufort Sea area, four seismic operators, one using a hovercraft, carried out over 12,000 miles of marine seismic reflection surveys.

Drilling and seismic operations were concentrated in four areas; Eagle Plain in the Yukon Territory, the Mackenzie delta—Tuktoyaktuk areas, Peel Plateau and the Arctic islands, specifically in the Sverdrup Basin.

Many applications have been received for permits, and industry interest was centered in particular in the Victoria Island—Davis Strait areas, and along the periphery of the polar ice. Applications will be processed after the amended Canada Oil and Gas Regulations are promulgated.

Table 1. Number of permits and leases, and relevant acreage
31 December 1972

Area	No. of permits	Acreage
N.W.T. mainland	1,976	89,384,248
Yukon mainland	551	22,975,845
Arctic islands	5,412	268,313,405
Arctic coast marine	1,331	64,397,346
	9,270	445,070,844
Area	No. of leases	Acreage
N.W.T. mainland	754	4,466,085
Yukon mainland	93	427,854
Arctic islands	Nil	Nil
Arctic coast marine	Nil	Nil
	847	4,893,939
Total Permits and Leases:	449,964,783	acres

Table 2. Revenues received, 1972

Yukon Territory	Revenues (\$)
Permit Fees	\$ 750.00
Transfer Fees	75.00
Lease Fees	2,950.00
Rentals	507,079.00
Forfeiture	Nil
Bonus	Nil
Royalties	22,549.80
Total	\$ 533,403.80
Northwest Territories	
Licence Fees	\$ 4,525.00
Permit Fees	231,502.00
Transfer Fees	37,795.00
Lease Fees	3,150.00
Rentals	4,136,291.41
Forfeiture	251,701.28
Bonus	Nil
Misc.	1,075.27
Royalties	299,579.96*
	\$4,965,619.92

*Estimated \$250,000 for Norman Wells

Additional gas discoveries were made in the Mackenzie delta by Imperial Oil Ltd. at p. Taglu West P-03 and Taglu C-42; Gulf Canada recovered hydrocarbons at their agmiotak F-48 well. Preliminary results from these previous discoveries indicate a potential for major gas and oil reserves in the Mackenzie delta. With an early freeze-up in the fall of 1972, the oil industry moved in a record number of rigs and equipment for winter drilling to evaluate the previous discoveries and test a number of additional prospects.

Two important natural gas discoveries were made by Panarctic Oils Ltd. at Panctic et al Drake F-16 and Drake B-44 wells, and at Panarctic et al Hecla F-62 well on the west coast of Sabine Peninsula. In addition, Panarctic recovered oil and gas at their Thor B wildcat well. These discoveries complement the 1969 Panarctic gas discovery at Ke Point, the 1970 discovery on King Christian Island, and the 1971 discovery at Stoffer Bay. In the 1972-73 winter season, exploration took place in the Arctic lands than ever before, with 13 rigs on sites employed over 1/2 million square miles. Gas Systems and Panarctic Oils Ltd. are continuing feasibility studies on a possible pipeline from the Arctic islands to the mainland. Two possible routes were proposed by Panarctic Oils Ltd. Both would cross Barrow Strait, one to proceed south along the west side of Hudson Bay, and the other along the east side of Hudson Bay. A preliminary reconnaissance of both routes was made during the past year. Revenues received during the year are recorded in Table 2 on the preceding page.

The number of wells drilled and seismic months worked will increase in 1973. Extensive marine seismic programs are provided for the Beaufort Sea and in the Baffin Davis straits. A Seadrill Operation, to land drill, is proposed for the Lancaster Sound area. A continuation of wildcat and development drilling in the Arctic by Panarctic Oils, Imperial Oil and Sun Oil, and other oil and development drilling in the delta by the major companies will increase the number of wells drilled to at least 80 in 1973. Drilling and seismic survey work should be at the same level in the other frontiers, and total expenditures may reach \$225 million in 1973.

Natural Gas Production

Norman Wells Field, N.W.T.

Production at Norman Wells for calendar 1972 totalled 958,956 barrels of crude

oil and 1,247,201 MCF of natural gas. Royalties will be approximately \$250,000, although final figures await the outcome of the annual audit made necessary by the Norman Wells Proven Field Agreement between Imperial Oil Limited and the Crown.

Pointed Mountain Gas Field, N.W.T.

The Pointed Mountain Gas Field came on stream on 31 August 1972. Production for 1972 averaged 94 MMCF/day for a total production of 11,678,233 MCF. Royalties received totalled \$49,479.96.

Beaver River Gas Field, Y.T.

The Beaver River Gas Field, straddling the Yukon-British Columbia border produced 2,613,657 MCF during 1972 from the Yukon portion of the field. Under a royalty sharing agreement between the Province of British Columbia and the federal government, 7 per cent of the total field production is assigned to the Yukon portion of the field. Royalties received for calendar year 1972 under this royalty sharing agreement totalled \$22,549.80.

Mining

The year saw a considerable increase in mining production but an overall decrease in staking activity in the two Territories. The combined value of mining production increased from \$207,249,351 in 1971 to \$226,567,000 in 1972, an increase of 9.3 per cent. Total mineral claims recorded in both Territories amounted to 12,400, a drop of 1,021 from the 1971 figure of 13,421 claims. There were, however, 17 prospecting permits granted in the Northwest Territories, bringing to 288 the total granted since 1961, when prospecting permits were first introduced.

Yukon Territory

The value of mining production in the Yukon increased from \$93,020,402 in 1971 to \$102,418,000 in 1972, an increase of \$9,397,598 or 10.1 per cent. This production came from five mines: three underground and two open-pit mines producing lead, zinc, silver, asbestos and coal with lead-zinc accounting for 76 per cent of the total production. Copper production was nil, since Whitehorse Copper Mines Ltd. was shut down for the entire year.

United Keno Hill Mines Ltd. (Silver-lead-zinc) continued milling at a rate of 220 tons a day with most of the production coming from the Elsa, Calumet and Husky Mines.

Exploratory work continued at the No Cash Mine, the Sadie Ladue and several other properties on Keno Hill.

Anvil Mining Corporation Ltd., (Lead-zinc) 130 air miles northeast of Whitehorse is the largest producer in the Yukon. The company increased its production from 7,248 tons a day in 1971 to 7,935 tons a day in 1972. It is expected that there will be a further increase in the milling rate in 1973.

Cassiar Asbestos Corporation (Asbestos) on Clinton Creek 50 miles northwest of Dawson increased its asbestos production in 1972 to 102,347 tons from 1,267,178 tons of ore milled.

Hudson-Yukon Mines Ltd. (Nickel-Copper) came into production in May 1972 at a rate of 600 tons a day. Concentrates are shipped by road from the mine to Haines, Alaska then by deep-sea vessels to world markets.

Whitehorse Copper Mines Ltd. (Copper) shut down its open-pit and milling operations in June 1972 and remained closed throughout most of 1972. Underground development including shaft sinking, drifting and stope preparation, which continued throughout the year. Production resumed in December 1972 at the normal rate of 2,200 tons a day. The ore body being mined averages just over 2 per cent copper as compared to 1 per cent from open-pit sources.

Tantalus Butte Coal Mine is producing coal at 80 tons a day. This mine is operated by Anvil Mining Corporation and the coal is used for drying lead-zinc concentrates.

There were 6,845 mineral claims recorded in the Yukon in 1972, an increase of 860 over 1971.

During 1972 exploration in the Yukon consisted both of continued detailed exploration in known mineralized areas and of reconnaissance exploration in less-known areas. Detailed geological mapping, geophysical surveys and diamond drilling were conducted by several companies in the Swim-Vangorda-Anvil area, the Minto area and the Whitehorse area. Placer Development has made a new base metal discovery on the Yukon-Northwest Territories border at Summit Lake, east of Ross River. Atlas/Dynasty have also made a base metal discovery 110 miles north of Ross River. Both of these may prove to be significant discoveries.

Hudson Bay Exploration and Development, Silver City, Bullion Mountain and United Keno Hill carried out exploration and evaluation projects on various mineral properties in the Territory.

Northwest Territories

The value of mining production in the Northwest Territories increased from \$114,228,949 in 1971 to \$124,149,000 in 1972 an increase of \$9,920,051 or 8.7 per cent. Production was from six mines: two open-pit and four underground operations producing lead, zinc, copper, gold, silver and tungsten. Lead-zinc production accounted for 85 per cent of the total value of production.

Pine Point Mines Ltd. (Lead-zinc) increased daily production from 10,545 tons a day in 1971 to 10,671 tons a day in 1972. In addition, underground exploratory and development work continued on the M-40 orebody. Surface diamond drilling continued west of the present pits with some success.

Con-Rycon-Vol (Gold) is producing at a rate of 451 tons a day. Underground exploratory work, including diamond drilling, has added approximately 1,000,000 tons of new ore to its reserves, which, at current rate of production, adds seven years to the life of the mine. Development work underground has continued to bring this new ore body to production.

Giant Yellowknife Mines Ltd. (Gold) production remained at 1,100 tons a day with approximately 800 tons coming from the Giant Mine and the remainder from adjoining and interconnected Lolor and Supercrest Mines.

Echo Bay Mines Ltd. production continued at a normal rate of 100 tons a day throughout the year, producing a silver jig concentrate and a silver-copper flotation concentrate.

Terra Mining and Exploration Company on Rainy Lake, 40 miles south of Great Bear Lake, is operating at 150 tons a day on its silver-lead-zinc property.

Canada Tungsten Mining Corporation (Tungsten-copper) situated on the Flat River in the Nahanni area operates an open-pit mine for approximately four months of the year and stockpiles ore for year-round milling. Milling tonnage is at 466 tons a day. Recently a new deposit was found in the immediate vicinity of the mine and underground exploratory and development work commenced.

There were 5,555 mineral claims recorded in the Northwest Territories in 1972, a drop of 1,450 from 1971. In addition, 17 prospecting permits were granted covering approximately 3,000,000 acres of mining land.

Exploration was carried out in all parts of the Territory in 1972. There were exciting new discoveries of lead-zinc mineralization by Placer Development near Summit Lake in

the Mackenzie Mountains on the Yukon-NWT border. These discoveries were the highlight of the year and sparked off a staking rush which is still in progress. In the high Arctic, the base metal deposit of Arvik Mines Ltd. on Little Cornwallis Island was penetrated by an underground decline. Underground exploration and diamond drilling is being carried out. Late in the fall diamond drilling was carried out at Strathcona Sound, the location of Texas Gulf's lead-zinc deposit, as part of a general feasibility study by Mineral Resources International.

Cominco and Tri-Con Surveys Ltd. conducted geological mapping, geophysical

surveys and diamond drilling in the Hack River area.

Numerous companies were involved in the Perry River area, the Camsell River area and in the District of Keewatin with geophysical surveys, geological mapping and diamond drilling. These areas remain interesting regions of activity.

In the Great Slave Lake and Pine Point areas various properties were trenced and drilled with some interesting intersection

The following table shows preliminary production figures for 1972 and compares figures for 1971 for the Yukon and the Northwest Territories.

Northwest Territories		1971	*1972
Gold	\$	10,897,934	10,537,000
	Ounces	308,339	288,000
Silver	\$	4,574,616	7,303,000
	Ounces	2,932,446	4,339,000
Copper	\$	727,595	609,000
	Ounces	1,378,021	1,204,000
Lead	\$	22,629,795	25,606,000
	Pounds	167,628,110	166,000,000
Zinc	\$	75,056,384	80,094,000
	Pounds	448,633,500	420,000,000
Cadmium	\$	301,476	—
	Pounds	155,400	—
Bismuth	\$	41,149	—
	Pounds	7,578	—
TOTAL		\$114,228,949	\$124,149,000
Yukon Territory		1971	*1972
Gold	\$	511,534	146,000
	Ounces	14,473	4,000
Silver	\$	8,966,417	9,330,000
	Ounces	5,747,703	5,620,000
Lead	\$	29,340,379	34,848,000
	Pounds	217,336,142	225,921,000
Copper	\$	2,709,696	—
	Pounds	5,132,000	—
Zinc	\$	39,003,342	43,861,000
	Pounds	233,134,144	230,000,000
Cadmium	\$	114,654	33,000
	Pounds	59,100	13,000
Asbestos	\$	12,374,380	14,200,000
	Tons	91,969	104,000
TOTAL		\$ 93,020,402	\$102,418,000

*Preliminary figures

ING REVENUE — 1972

T. & Yukon

	\$ 427,099.00
alties	585,878.00
of claim sheets	3,395.00
feitures	48,973.00
se rentals	48,223.00
ellaneous	6,245.00
TOTAL	1,119,813.00

Development and Incentive Program

The major task of this section during the was the administration of northern s and airports. Its secondary function to administer the Northern Mineral Ex- tation Assistance Program and the incent- programs related to access road and air- construction assistance.

The Northern Roads Program, approved in s, provides for a 10-year \$100 million ect to construct roads that connect cen- of population and provide access to of resource potential. Provision is made e program for cost-shared roads

ired for exploration or development oses. Assistance is available for the con- tion of medium-standard roads (initial s), and higher-standard roads (perma- access) to approved resource development cts. Experience gained in administering

rogram made it possible to introduce y amendments in the late '60s to 1971. ne of the main features of the revised y is to provide for constructing pioneer s. This new category of road is to prov- mitted access to undeveloped areas with al resource potential. The new policy provides for conservation measures n will further protect the northern lands n minimize surface disturbance from ortation operations.

penditure on new highway con- tion for the past five years was \$43 n. For 1972, \$10 million was eted, and by 1977 the aggregate total is estimated at \$131 million. New high- construction costs are supplemented by onstruction budget which averages \$3 n a year.

he total amount of road construction nce extended on a cost-shared basis ndustry in the last eight years is 9,175.

he Northern Resources Airports Pro- provides financial assistance, on a cost- d basis, to construct airports necessary ccess to resource exploration and dev- ent projects. Since its inception in 27 applications have been approved

and a total of \$271,769 has been paid in contributions.

To encourage the direction of capital to northern ventures, the government intro- duced the Northern Mineral Exploration Assistance Program under which 40 per cent of all exploration costs of mineral and oil and gas may be recovered, and are repayable only if, as a result of the discovery, produc- tion ensues. Since the inception of the pro- gram in 1967, 167 applications have been approved and a total of \$3,535,628 has been paid in grants, leaving an outstanding com- mitment of \$548,637.

Plans for 1973

Development Analysis

During 1973 heavy emphasis will be placed on developing road access to Inuvik, N.W.T. The increasing pace of activity in the Mackenzie delta and the Arctic islands re- gions, and the need to connect one of the major population centres of the north to the northern roads network makes it imperative that road access from the south be com- pleted as soon as possible.

The use of incentives will be stressed in 1973 to encourage the development of re- sources in the North to provide permanent employment for northern residents.

Water, Forests and Lands Division

Forest Management

Review of 1972 Operations

Three forest survey reports were com- pleted in 1973; the *Lower Liard River (Area C) Northwest Territories* by Reid, Collins and Associates Limited; the *Pelly and Mac- Millan River Watersheds Yukon Territory* by F.F. Slaney and Company Limited; and the *Upper Liard River Forest Unit (Zone IV) Yukon Territory* by Schultz-Thériault.

Due to continuous overcast or smoke during the summer the planned photography of the Nisutlin River watershed did not occur.

Lumber production was significantly lower in 1972 than in 1971, but an increase in the utilization of roundwood and fuel- wood almost made up the difference so that total production was approximately the same. A total of 2,431 thousand cubic feet was produced in 1972, compared to 2,573 thousand cubic feet in 1971.

The Territorial Timber Regulations were reviewed and a draft was prepared of a pro- posed revision. The main purpose of the revi- sion is to provide authority respecting the

long-term sale and disposition of timber on Territorial lands and to provide for improved management, utilization, conservation and reforestation of the forest resources of both Territories.

Plans for 1973

- After a review of the existing draft by all interested parties, it is planned to com- plete the revision of the Territorial Timber Regulations.
- To facilitate the management and disposal of timber, portions of both Territories are to be divided into forest management units.
- Before further inventory work can be con- ducted, it is necessary to update 25-year- old photography in three main areas. They are the Nisutlin River area, the Fort Simpson area and west of the Beaver-La Biche River area.
- Preparatory to further field work in 1974, existing plot samples and statistical data from different organizations will be com- piled.

Forest fire management

Review of 1972 Operations

The Northwest Lands and Forest Service dealt with 329 fires burning over 551,972 acres of forest and tundra. June, July and August accounted for 306, or 93 per cent of the fires, including several outbreaks with multiple fires around the western half of Great Slave Lake.

In the Yukon Territory, the Yukon Lands and Forest Service fought 143 fires which burned over 163,521 acres. Lightning ac- counted for 83 fires which represent 58 per cent of the total. These burned more than 158,800 acres of vegetation. Multiple fires and lack of adequate road systems were again major contributory factors to these figures.

To improve its ability to fight fires the Northwest Lands and Forest Service began reorganizing, decentralizing and recruiting trained fire-fighters. The overall objective of this plan is to significantly improve the abili- ty of the service to detect fires and ex- tinguish them in the early stages. A major part of this plan calls for training élite fire- fighting crews made up of the indigenous people of the Territory.

The Yukon Lands and Forest Service started a comprehensive training program to

develop a core group of élite Indian and Eskimo fire-fighters.

Plans for 1973

In 1973 the Yukon Lands and Forest Service will enter phase I of a program to bring its fire control capability to an adequate level. The primary aim of this program is to increase the detection and initial action capabilities of the Service by co-ordinated use of trained fire-fighters, helicopters and fixed-wing aircraft for detection, support of fire-fighting operations and retardant bombing.

A detailed review of fire control work in the Yukon Territory will be completed to provide a basis for planning and operations in the future. Emphasis will be placed on a scheme to assess resource values to facilitate development of criteria for priority zones, action guides according to priority zone, fire load and available fire-fighting resources. A field manual will be prepared to assist the two services in effectively implementing the fire management policy.

A review will be made of the Yukon Territory and the Northwest Territories Forest Fire Protection Ordinances to assess their applicability in terms of present policy, regulation and penalties.

Water management section

Review of 1972 Operations

The water management staff began to lay the foundation for water programs in the North. Policies were formulated, plans developed, and some preliminary studies and projects were initiated.

On February 28 the Northern Inland Waters Act was proclaimed with regulations being promulgated on September 14. The Act sets the stage for the planning, development, conservation and management of the water resources of the Territories. The legislation created a water board in each Territory to assist the department with water management and, with the approval of the minister, to issue water use licences. There are nine members on each Board, six from federal agencies and three persons named by the commissioner of the Territory. A unique feature of the Act is the requirement for public hearings associated with each water licensing procedure. The regulations divide each Territory into convenient geographical units called water management areas, outline the procedure for making a water use application, and prescribe a user charge.

The Arctic Waters Pollution Prevention Act and Regulations came into force on August 2. Basically the Act prohibits the deposit of waste in Arctic waters either directly or indirectly from any source, except as authorized by the regulations. Responsibility for administering the legislation is divided among three federal agencies: Ministry of Transport for shipping activities, the Department of Energy, Mines and Resources for non-shipping activities in Hudson Bay and Hudson Strait, and the Department of Indian Affairs and Northern Development for non-shipping activities in the remainder of the Arctic. The regulations enable the enforcing of certain standards of construction or operation intended to prevent the deposit of waste, establish limits of liability that may be attached to any undertakings, and designate certain officials of the department as pollution prevention officers who may inspect all undertakings and to whom all violations of the Act must be reported.

The Water Management Section continued to administer the Dominion Water Power Act and collect water and land rental fees for licenced hydro-electric power developments in national parks and on Indian reserves as well as in the North. All new hydro-electric developments in the North, however, will be licenced under the Northern Inland Waters Act with the Dominion Water Power Act gradually being phased out, except for federal lands outside the Territories.

The section continued its inventory of hydro-electric potential with some preliminary investigations of major streams flowing into the Mackenzie River. Over one third of the Territories is now in the inventory. A major study of the water resources of the Mackenzie River basin was launched at a seminar held in Inuvik in June. The department, joined by officials of the Territorial governments, met with the provinces of British Columbia, Alberta and Saskatchewan, and federal agencies with water interests in the North to discuss common water problems and to seek out solutions on co-ordinate joint studies within the Basin. The Section continued to provide advice on water matters pertaining to pipelines, highways, oil and mineral developments and community supply and disposal systems.

Water Management Plan for 1973

Water licensing under the Northern Inland Waters Act will enter its most active year with perhaps 50 applications expected to be processed, including site investigations,

sampling, public hearings and final approvals. Partly in support of licensing and the broader aspect of comprehensive water management a program of water quality sampling and stream gauging must be undertaken. Network planning will begin in 1973 together with installation of some new stations and reappraisal of the existing system. Some small watershed studies will be initiated in high-demand areas where water is sold at a premium. Technical assistance will be given to the Territorial governments in support of a program to up-grade water supply and waste treatment facilities at northern communities. The inventory of hydro-electric power potential will continue. The first elements of the Mackenzie Basin Study will be planned in 1973, with considerable work to be done to identify and consolidate the existing information base.

Some housekeeping-type amendments must be made to the Northern Inland Waters Regulations and a new regulation developed relative to water quality standards. It is proposed to review the fee schedule and carry out a general assessment of the Act and its impact on northern waters and water users. An administrative framework will be developed for the Arctic Waters Pollution Prevention Act, particularly for its application to offshore exploration drilling for oil and gas. In addition, a strategy and policy for spills prevention, reporting and clean-up must be clarified and implemented in 1973.

Land Administration Section

Effective 1 April 1972 the responsibility for accepting land applications and for negotiating lease and sale agreements for all the land in the Northwest Territories was decentralized to the office of the Supervisor of Land at Yellowknife. Coupled with a delegating authority to the regional directors, resources to execute all land transactions on behalf of the minister, this placed both Regional administrations on equal footing since similar action for the Yukon had been taken some years ago.

The program of transferring the Development Control Zones surrounding the communities in the Territories continued. The total area now under the direct administration of the Territorial governments is 1,250 square miles; 331 in the Yukon and 1,250 in the Northwest Territories. During the transitional period leading to the formal transfer of all applications for land within the designated Development Control Zones are processed through the Territorial government.

Some 118 legal surveys were co-ordinated on behalf of the federal and Territorial Governments and the general public to meet the zoning requirement for lands. This figure does not include all of the surveys carried out on behalf of lands under Territorial administration. More than 700 new applications for lands in both Territories were filed and dealt with. Due to the transfer of Development Control Zones to the Territorial governments this figure indicates an increase in the number of applications being filed for development purposes in the more remote areas of the Territories. Numerous reservations for other federal government departments and agencies were made. A right-of-way permit was issued covering the portion of the Westcoast Transmission Company Pointed Mountain-Beaver River gas line lying within the Territories. This permit will be used as a basis for all future transactions of this sort. Negotiations were initiated with Amoco Canada Petroleum Company Ltd. on the terms and conditions to be embodied in the various documents covering the Pointed Mountain gas line.

A study of current legislation, regulations and policies regarding all phases of public administration was completed under contract. The residue of the old Dominion Land Records containing information on original grants of Crown lands in the Western Provinces before 1930 were transferred to the Public Archives of Canada. Work began on the compilation of abstracts of title for former Ordinance and Admiralty lands to determine their extent and most economical use. The preparation of histories of federal land holdings along the Rideau Canal portion of the take-over of the system by the National and Historic Parks Branch was almost completed. Agreement was reached on terms and conditions for the sale of former Ordinance Lands in the Province of Quebec to La Maison Painchaud Inc. Société de St-Vincent de Paul de Québec (parent body) to be used in the rehabilitation of ex-convicts.

Program for 1973

The Development Control Zone transfer program will continue on the basis of priorities established by the Territorial governments. Based on the study carried out in 1972, policy proposals will be developed, preliminary to the drafting of amendments to the Territorial Lands Act and a complete revision of the Territorial Lands Regulations, in response to an ever-increasing demand

for lands for summer residences in the Territories, a plan will be introduced to develop cottage-lot subdivisions in advance so as to prevent the haphazard development of the more readily accessible and desirable water bodies.

Economic Staff Group

Responsibilities

The Economic Staff Group does research and conducts studies on matters relating to the economic development of the North and advises senior management of the department.

Functionally, the group is divided into two sections. The Resources and Transportation Section is responsible for doing studies and developing appropriate policies and programs regarding the development of renewable and non-renewable resources and the provision of adequate transportation in the North. The Regional Planning and Manpower Section is responsible for conducting research and studies on problems related to regional economic and policy planning, to demography, and to labour force matters, including the employment of northern residents arising from the development of northern industry. In addition, it is responsible for the development, testing and operation of planning, analytical and forecasting models of the northern economy.

Review of 1972 Operations

During 1972 the Economic Staff Group conducted a variety of research projects and studies, and undertook other projects with private consultants on behalf of the department. These projects covered a variety of subjects, but the formulation of a strategy for the development of the Territories and the establishment and pursuance of national objectives with respect to the North continued to be accorded top priority in the Group's work.

The Resources and Transportation Section undertook a number of resource feasibility and transportation studies, while most of the research undertaken by the Regional Planning and Manpower Section was designed to extend work on the strategy for northern development and to provide information and research results which would be useful in the process of implementing the strategy.

Research Projects Carried Out or Directed by the Group

A. Projects by officers of the group:

- Studies relating to housing, income distribution, the effect of education on earnings, and financing of business enterprises in the North.
- The application of an optimizing model for economic development to problems of economic planning in Northern Canada.
- A study of health in the Northwest Territories.
- A study of the socio-economic implications of gold mine closure in the Yellowknife region.
- Studies on development planning in Northern Canada.
- Analysis of applications for east-west air service in the Northwest Territories.
- Yukon and Northwest Territories Manpower Surveys.
- Comparison of the economics of the barge-tug supply versus aircraft for Old Crow.
- Update of benefit-cost analysis of Fort Simpson—Fort Liard Road.
- Preparation of Statistical Abstract for the Northwest Territories.
- Review of Resource Airports Program.
- A study of problems of measuring standard of living in the North.
- The development of a classification of revenues and expenditures by level of government in the northern territories.
- Survey of northern transportation costs — and comparison of southern and northern Canadian trucking costs.

B. Projects by contract employees:

- A study (in collaboration with other Departments) of possible transportation alternatives in the Mackenzie Valley over the next 15 years.
- An analysis of the socio-economic impact of large diameter pipeline construction, operation and maintenance in the Yukon and the Northwest Territories (a joint study by the consultant and the Group).
- Development of a conceptual framework of social accounts for the North.
- Feasibility study of a bilingual Mackenzie Planning Atlas.

Future Plans

Projects to be undertaken by the Group or on behalf of the Group in 1973 and in the

foreseeable future are all geared towards achieving the following goals:

- To work towards the development of a regional planning framework for northern development in response to the Policy for Northern Development 1971-81.
- To study specific northern industries and sectors which have critical roles in the northern development process.
- To recommend policies for northern development and methods by which policy aims are realized.
- To develop models which enable policies, programs and policy instruments to be tested and modified.
- To develop an accounting framework for the assembly of data on the northern territories.
- To examine existing incentive programs for northern development.
- To develop social and performance indicators to be used in evaluating northern programs.

Northern Science Research Group

Responsibilities

To sponsor and conduct research into human problems associated with development of the North; to encourage and support such research by non-government agencies; to collect and disseminate scientific information, and to operate the Inuvik Research Laboratory.

Long-term Plans

To assist in the development of the Canadian North by encouraging scientific investigation; to provide advice and research services to organizations within the department; to co-ordinate the collection of information on arctic developments outside Canada; to formulate detailed research plans and to see that they are carried out; to interpret and assess relevant research done by other agencies.

Review of 1972 Operations

Northern research continued in 1972 with an emphasis on work related to problems of social change for native people in the North (and, in particular, on the possible effect of pipeline construction). A considerable portion of research during 1972 was done by university scientists working under contract or in seasonal employment.

Research

Projects carried out or directed by the group

- Problems of modernization for native people in the North. Continuing in 1973.
- Production of a community development film for northern people. A joint project with the National Film Board filmed in Greenland.
- Development Strategy in Greenland — a report on comparative development in Greenland and the Canadian Arctic. Continuing in 1973.
- Danish and Greenlandic press clippings. Continuing in 1973.
- History text on northern Indians and Eskimos of Arctic Canada. Continuing in 1973.
- Water Supply and Waste Disposal Systems for Frobisher Bay, N.W.T. A conceptual look at alternative systems.
- Bibliography of Scientific Literature of Settlements in the Yukon, the Northwest Territories and Nouveau Québec.
- Report on Municipal Services for Communities of the N.W.T.
- Comparison of Utilidors in Inuvik, N.W.T.
- Arctic Sanitary Engineering Bibliography, preliminary draft.
- An evaluation of Municipal Services in the Mackenzie River Delta Communities.
- Report on the Canada — USSR Research Exchange Program.
- Deviance and Social Control: Manifestation, Tension and Conflict in Frobisher Bay — a study of the sociological roots of violence at Frobisher Bay, N.W.T.
- Crime and Society in Churchill — a study of the sociological roots of violence at Churchill, Manitoba.

Grant Program for Northern Research Institutes and Scientific Research Expeditions.

In 1972, the eleventh year of this program of assistance to institutes and expeditions, amounts totalling \$300,000 were awarded, as recommended to the Minister, by a grants committee. Through these grants a large number of northern research projects was supported in a wide variety of scientific disciplines. Grants were made to:

Arctic Institute of North America
Arctic Studies Group (Université de Montréal)

Boreal Institute (University of Alberta)
Centre d'Etude Nordiques (Université Laval)

Committee on Northern Studies (University of Manitoba)

Committee on Arctic and Alpine Research (University of British Columbia)
Institute for Northern Studies (University of Saskatchewan)

Committee for Arctic and sub-Arctic Research (University of Toronto)

Arctic Studies Conference (Université d'Études de Saint-Jovite)
Institute of Social and Economic Research (Memorial University)

McGill Committee for Northern Research (McGill University)

The Devon Island Expedition (Arctic Institute of North America)

The Icefield Ranges Research Project (Arctic Institute of North America)

The University of Ottawa

The University of Western Ontario

The Université du Québec à Chicoutimi

Grants for Applied Research Meeting Specific Requirements of this Department.

These grants were initiated in 1969-1970. Their purpose is to support research in problem areas specified by the Department of Indian Affairs and Northern Development. \$92,000 was allotted in 1972.

A grant of \$30,000 has also been made to the Arctic Institute of North America to publish the Arctic bibliography. Research supported by the applied grants program continues into the following year.

The Scientific Research Laboratory, Inuvik, Northwest Territories.

Opened in 1963, this laboratory provides a general laboratory and other facilities to support a variety of scientific disciplines. It includes a cosmic-ray measurement annex, low-temperature rooms, photographic darkroom, library, seminar room, offices, and general or special laboratories. The laboratory lent support to approximately 300 investigators and 225 scientific projects, and provided 3,000 accommodation-bed nights. Several abandoned DEW Line stations have been renovated for use as scientific research units.

Plans for 1973

To continue to develop programs of research directed toward the human problems of northern development, and in particular to emphasize assessment of the potential social effect of pipeline and highway construction in the North. Increasing scientific interest in the North, stemming from the

ing emphasis on economic development, has created a need for laboratory facilities in the eastern Arctic to parallel those provided at Inuvik, western Arctic. The construction of a research laboratory is planned for Igloodik in the Foxe Basin area. It will be on the coast in an area of geological, climatic and topographical diversity and in a region where renewable resources are exceptionally rich. Construction began in 1973 and will provide much-needed facilities for scientists, for government, universities and industry.

TERRITORIAL AFFAIRS BRANCH

Territorial Division

Responsibilities

To act for the federal government in the negotiation and administration of federal-territorial financial agreements with both Territories.

To review fiscal and legislative policies and development plans for both the Yukon and Northwest Territories and to advise the deputy minister on matters relating to the administration of the Territories.

To co-ordinate the work of the Department of Indian Affairs and Northern Development and the governments of the Yukon Territory and the Northwest Territories in all federal matters not related to natural resources.

To advise the commissioners of the Yukon and the Northwest Territories on matters of government administration in the two Territories.

To co-ordinate the transfer of provincial-type services under the jurisdiction of the federal government to the governments of the Yukon Territory and the Northwest Territories.

To co-ordinate arrangements between the territorial governments and other departments and agencies of the federal government on matters affecting areas of Territorial government responsibility.

Term Plans

To develop long-term federal-Territorial policies and financial agreements with the Yukon Territory and the Northwest Territories and to assist the governments of the two Territories in the exercise of their responsibilities and in the

development of a more responsible form of government.

- To support proposals on Territorial fiscal and legislative policy before federal co-ordinating and control authorities.

Review of 1972 Operations

The transfer of provincial-type functions performed by federal government departments to the two Territorial governments continued under the overall co-ordination of the division. A comprehensive cost-shared legal aid program was introduced in the Northwest Territories and negotiations were carried on for a similar program for the Yukon. The division completed arrangements to introduce Medicare in the Yukon on 1 April 1972. The division also helped to set up a federally financed Territorial Rental/Purchase Housing Program in the Yukon. Arrangements were completed for the government of the Yukon Territory to assume responsibility for maintaining the Yukon section of the Alaska Highway. The

Northwest Territories Council Task Force on Housing submitted their report in June 1972, and subsequently a working group consisting of officers of the Territorial Government, Treasury Board, Central Mortgage and Housing Corporation and this department was established to study the major recommendations and to plan a course of action.

The Northern Rental Housing Program in the Northwest Territories, which is administered by the Territorial government on behalf of this department, provided 110 new three-bedroom houses for Indians and Eskimos.

Under the Small-Business Loans Program 18 loans totalling \$314,800 were granted to small-businessmen in the Yukon.

In the Northwest Territories 18 loans were approved for a total of \$432,000.

Financial assistance for the governments of the Yukon Territory and the Northwest Territories was appropriated in 1972-73 in the following amounts:

a) Financial Agreements

	<i>Yukon</i>	<i>Northwest Territories</i>
Operating deficit grant	\$10,441,000	\$56,575,000
Capital loans	6,869,000	19,660,000
Amortization grant	2,932,000	4,797,000

b) Additional Financial Assistance outside the Agreements

1) Yukon Territory

Grant — administration transfers	\$ 621,500
Contribution — hospital care of Indians and Eskimos	110,000
Contribution — Medicare for Indians	108,000
Second-mortgage loans to residents (CMHC)	100,000
Loans to third parties	400,000

2) Northwest Territories

Contribution — hospital care of Indians and Eskimos	822,000
Contribution — Medicare for Indians and Eskimos	368,000
Contribution — 1st-mortgage low-cost housing subsidies	10,000
Territorial rental housing loan	895,000
Contribution — toward Eskimo acquisition of boats	15,000
Loans to third parties	1,155,000
Grant — administration transfers	1,638,900

The division co-ordinated the negotiations for federal-Territorial financial agreements to begin 1 April 1973 for both Territories.

Plans for 1973

The administration, co-ordination and supervision of a one-year financial agreement which begins 1 April 1973 for both Territories to be carried out under the following terms:

	<i>Yukon</i>	<i>Northwest Territories</i>
Operating grant	\$6,864,000	\$56,025,000
Grant in lieu of income taxes	4,637,000	6,471,000
Amortization grant	3,583,000	7,276,000
Capital loans	5,600,000	15,600,000
Loans for relending to third parties	120,000	2,555,000

Research is continuing into possible new procedures for federal financial assistance to the Territorial governments.

Northern Services Division

Responsibilities

The Northern Services Division co-ordinates the administration of special programs for Eskimos and other northern residents, either on behalf of the Government of the Northwest Territories or representing residual federal responsibilities.

The division has five major sections: the Eskimo Services Section, the Education Section, the Employment Liaison Section, the Indigenous Claims Section and the Commercial Development and Opportunities Section.

The Eskimo Services Section provides specialist advice on various matters relating to Eskimos and northern native people generally. The section has a translation service in the Eskimo language, publishes an Eskimo magazine, and also furthers the promotion of Eskimo art and culture by loaning the department's collection of Eskimo arts and crafts to museums, universities and other large institutions in Canada and abroad. It also provides cultural grants to Eskimos, and sponsors Eskimo literature and films. In addition, the Eskimo Services Section is responsible for the Eskimo Loan Fund, the Eskimo Small Boats Assistance Scheme and the Canadian Reindeer Project. Assistance is provided to Canadian Arctic Producers Limited, the central marketing agency for northern arts and crafts, in the development of new products.

The Education Section provides a staff of specialists responsible for counselling, making training arrangements, relocation and employment assistance for Eskimos in Southern Canada. It operates the education facilities at Fort Churchill, Manitoba, which includes a pre-vocational school and the Duke of Edinburgh School, which is a regular school for the students residing at Fort Churchill. Expenditures on education by this section at Fort Churchill, Manitoba were over one million dollars.

The Employment Liaison Section provides contact with resource development industries, labour unions, federal departments and Territorial governments to ensure that the native northern residents have every opportunity to share in and benefit from the development of the North.

The Indigenous Claims Section conducts intensive research and prepares position papers on claims by the indigenous peoples of the Northwest Territories and the Yukon Territory.

The Commercial Development and Opportunities Section examines the financing of commercial enterprises in the North, identifies potential economically viable enterprises and conducts studies aimed at establishing major commercial enterprises in the North.

Long-term Plans

The Northern Services Division will continue to provide specialist advice on various matters relating to Eskimos and the North in general. Emphasis on Eskimo cultural development will be maintained and plans will be completed to transfer enterprises such as the Canadian Reindeer Project and Canadian

Arctic Producers Limited to native control and ownership. The division will strive to ensure the implementation of the policy of the Government of Canada, Northern Canada in the 70s, where the first priority is that of creating employment opportunities for native people. It will also continue to examine claims of indigenous peoples based on a concept of aboriginal title and conduct studies aimed at establishing major commercial enterprises in the North.

Review of 1972 Operations

1972 saw the decentralization of the Eskimo Loan Fund into two accounts, one for the N.W.T. administered in Yellowknife and the other for southern Canada. Loans amounting to \$182,700 were approved. An amendment to the regulations of the Eskimo Loan Fund now permits borrowing by Credit Unions, Caisses Populaires or other credit societies.

A major international Eskimo art exhibit — The Masterworks of the Canadian Arctic — organized by the Canadian Eskimo Arts Council was shown in Paris, Copenhagen, Leningrad, Moscow, London, and across Canada. The exhibit further stimulated the demand for Eskimo arts and crafts. Requests for the departmental circulating collection of Eskimo art from schools and institutions both in Canada and abroad were received in increasing numbers.

During the year, the Eskimo Language School at Rankin Inlet was transferred to the Government of the Northwest Territories, and the relocation project to permit Eskimos to relocate to permanent wage employment at Lynn Lake, Manitoba was reactivated. The section arranged special training courses for residents of the Northwest Territories at various Canadian Forces Bases across Canada.

The Employment Liaison Section monitored and updated agreements for the employment of native northerners with Pink Point Mines, Canada Tungsten and Anvil Mining. The section also arranged a system whereby northern residents were given consideration for employment on the Mackenzie valley highway.

Plans for 1973

The Northern Services Division will continue to administer and improve programs. These include providing economic development grants to Eskimos of the Northwest Territories, cross-cultural conferences to promote better understanding, the support

film production dealing with northern
aspects of human interest, publication of in-
formational material on Eskimo art, assist-
ance to Eskimo authors and artists.

The Employment Liaison Section will
continue to ensure employment opportuni-
ties on the Mackenzie valley highway are
made available to northern residents es-
pecially native peoples. The section will
complete and discuss with industry an em-
ployment and training agreement which will
ensure training and employment opportuni-
ties for northern residents on the proposed
Mackenzie valley pipeline.

DEPARTMENT OF JUSTICE (JUST)

Responsibilities

Appointment of Judges to the Territorial supreme courts, and the direction of court proceedings on behalf of the Crown, including prosecutions under the Criminal Code and other federal statutes. The department has also a shared responsibility for the cost of legal aid in the Northwest Territories.

Review of 1972 Operations

An additional Crown prosecutor was appointed in both the Northwest Territories and the Yukon Territory making a total of three in the Northwest Territories and two in the Yukon Territory. Payments totalling \$21,638.24 were made to the Northwest Territories, representing the federal share of the cost of legal aid for the year ending 31 March 1972.

Discussions were started with both Territorial governments on arrangements for the introduction of a shared-cost program to provide compensation to victims of crime.

Discussions are continuing with the Government of the Yukon Territory concerning a shared-cost legal aid program in that Territory.

Plans for 1973

Present responsibilities of the Department of Justice will continue. It is hoped that discussions now taking place will result in the establishment of a shared-cost program providing compensation to victims of crime and the setting up of a shared-cost legal aid system in the Yukon Territory.

The legal aid agreement between the Northwest Territories and the federal government must be renegotiated in 1973. The terms of this agreement will be reviewed in the light of experience and it is expected that the existing program will be continued with such changes as appear desirable.

DEPARTMENT OF MANPOWER AND IMMIGRATION (M&I)

Possibilities

The aim of the department is to further economic growth of Canada by endeavouring to ensure that the supply of manpower matches the demand qualitatively, quantitatively and geographically; to encourage a flow of desirable immigrants suitable to the needs of the country, and control the entry into or stay in Canada of non-immigrants.

Long-term Plans

The services of the department will be extended to people in the major population centres as well as to those in more remote areas. Itinerant services, a broadened Industrial Training Program, and a number of other programs, will be made available to residents of the North.

The department will continue to determine the manpower needs of employers in the North and arrange for suitable training courses for northern residents so that their qualifications might be acceptable to employers.

Review of 1972 Operations

Full-time offices serve Whitehorse, Yellowknife and Inuvik, and there are two branch offices, at Hay River and Fort Simpson. The branch office in Fort Simpson opened in June to provide services for the construction of the Mackenzie Highway. A migrant service was provided to all the northern settlements; the frequency of visits depending on the need for services. A total of 17,337 workers and employers requested assistance in 1972. Of these, 5,316 were employed. Workers were assisted under the Manpower Mobility Program to

travel to training institutions and to either explore or accept jobs away from their normal place of residence. Increased oil exploration in the Mackenzie delta and Arctic islands and the construction of the Mackenzie and Dempster highways provided employment for people who had limited previous exposure to a wage economy. Counselling services continue to be of prime importance because of the major development taking place and the special problems encountered by people from isolated areas who are on the threshold of a changing life style.

Training

There were substantial increases in the number of courses offered and greater participation in training for both the Yukon Territory and the Northwest Territories. Courses geared to present and future economic needs of the developing economy are producing graduates trained as heavy-equipment operators, pipeline equipment operators, underground miners, and clerk-typists to name a few. Other special courses provided for the department included: game guide, fire suppression, prospecting, arts and crafts, rod and chainmen, and business management. An expanded Manpower Industrial Training Program resulted in significant use of the program, particularly in the mining and service industries. Courses and basic training for skill development and basic industrial skills were offered in more than 16 settlements. Basic literacy and life skills were added to basic education courses. First- and second-year apprenticeship courses in carpentry and heavy-duty mechanics were offered for the first time in the Northwest Territories.

Direct Employment Program

Programs to create jobs during periods of unemployment continued in early 1972 and were re-introduced in the fall. Local Initiative Projects, which can continue until 31 May 1973 have produced over 7,000 man-months of work since the program's inception in late 1971. The need for continued on-the-job training was met by the training-on-the-job element of the Manpower Industrial Training Program. The initial phase of the program resulted in the signing of 63 contracts.

Vocational Rehabilitation

Vocational Rehabilitation of Disabled Persons Agreements are held between the department and the Territorial governments. The agreement's main function is to provide comprehensive rehabilitation services to disabled persons. Services include medical and manpower assessment, training and placement, and are achieved through co-operation with other agencies.

Immigration

In 1972 of all persons admitted to Canada as immigrants, 305 gave their destination as being either the Yukon Territory or the Northwest Territories. Of this number, 134 were destined to the labour force and the remainder (171) were dependants.

Jurisdictional and Operational Responsibilities

Jurisdictional and operational responsibilities for services of the department in the Canadian North were as follows:

- The area officially defined as the Yukon Territory is under the jurisdiction of the Director General, Pacific Region, Department of Manpower and Immigration, 1155 West Pender Street, Vancouver 1, B.C.

- The area officially defined as being in the Northwest Territories, i.e., the districts of Mackenzie, Keewatin and Franklin, is under the jurisdiction of the Director General, Prairie Region, Department of Manpower and Immigration, 1200 Portage Avenue, Winnipeg, Manitoba, R3G 0T5.
- The Director General, Quebec Region, Department of Manpower and Immigration, 550 Sherbrooke Street, West, Room 524, Montreal 2, Quebec, is responsible for the area in Northern Quebec.

Plans for 1973

Yukon Territory

An enlarged itinerant and outreach service will be provided to the more isolated communities. In co-operation with the Territorial government, a Manpower Needs Committee will be established to identify the manpower requirements and training needs particular to the Yukon Territory. If facilities can be made available, diagnostic and assessment services for the disadvantaged will be further expanded.

Northwest Territories

Yellowknife and Inuvik will continue to have permanent Canada Manpower Centres and Hay River will continue as a branch office. Activity on the Mackenzie Highway will determine the type of service provided at Fort Simpson.

In the Eastern Arctic, a full-time Canada Manpower Centre will be opened at Frobisher Bay in July 1973 to provide regular service to Baffin Island and the High Arctic. Itinerant service to North Baffin and the Arctic Islands will be provided from Frobisher Bay.

DEPARTMENT OF NATIONAL DEFENCE (DND)

CANADIAN ARMED FORCES

Responsibilities

The Canadian Armed Forces are responsible for:
 the support of Canada's national policies by contributing to the protection of Canada's sovereignty;
 all aspects of maritime, land and air defence (in some areas these tasks are carried out in co-operation with our allies under international agreements);
 operating rescue co-ordination centres, and providing aircraft search and rescue services;
 assisting other government departments and civilian agencies in national development projects, and in time of civil emergencies.

Long-term Plans

Within the context of these responsibilities the Department of National Defence is continuing its increased scale of activities in Canadian Arctic. It is conducting a continuing surveillance of Arctic lands and waters, and is training troops to live, work and fight summer and winter in arctic conditions. In support of these operations, it has increased its ability to deliver airborne troops to remote parts of the Arctic and to operate heavy aircraft in the North. Its transport operations are increasing, and it is co-operating with other government departments to increase the number and size of operational flights in the Arctic. During the past three years its naval forces have penetrated the Arctic seas with large ships. Organized rescue of northerners for the Canadian Armed Forces has begun. Meanwhile, a broad range of studies and analyses is in progress, aimed at developing programs in support of national defence activities for the North. Assisting in all

these activities is the northern region headquarters at Yellowknife.

Review of 1972 Operations

Maritime Forces

As in 1971 Canada's northern waters and airspace were again the scene of considerable activity by Maritime Command. Activities included general sovereignty and surveillance flights, search and rescue missions, flights conducted in support of other government agencies, and training exercises.

Argus aircraft flew some 40 missions into the Arctic for a total of 1,681 flying hours, and Tracker aircraft flew a total of 415 hours. The Argus aircraft flew from northern bases at Frobisher Bay, Yellowknife, Inuvik and Thule while the Trackers operated from Goose Bay and Frobisher. Although the primary purpose of these flights was sovereignty protection and surveillance, many sorties were flown in support of other government departments. Examples of this support included ice reconnaissance, photographic missions, a search for Bowhead whales in the Beaufort Sea, and investigation and reporting of off-shore oil explorations and of oil drilling rigs on the archipelago. Also, scientists and observers from other government departments were frequently on board these aircraft to conduct special projects which were beneficial to both the Department of National Defence and to the government department in question.

In August 1972 units of Maritime Command deployed to the vicinity of Hudson Strait to conduct "Norploy 72". Participating units included HMC Ships *Protecteur*, *Fraser*, *Yukon*, *St Laurent* and *Onondaga*; Argus aircraft from VP 404; and Tracker aircraft from VS 880. The deployment included environmental

training and tactical exercises en route to, and in Arctic waters; various scientific and biological experiments; the establishment of a significant Canadian Forces presence in the North; and visits to Arctic settlements. In the latter case, visits were made to Port Burwell, Lake Harbour, Cape Dorset, Koartac, and Wakeham Bay. Of particular interest was the support given to a scientific expedition from Acadia University. A scientific team was carried to and from the expedition site on Baffin Island by *HMCS Protecteur*. The team gathered scientific data which was later analyzed at the university.

Land Forces

The continuing series of sub-unit exercises, called "New Viking" has gone on throughout the year. These exercises are designed to prepare ground forces for surviving and fighting in arctic conditions, summer and winter. Apart from providing an almost continuous military presence in the North, these exercises had, by the end of 1972, familiarized more than 4,000 officers and men with the geography, terrain, climate and operating difficulties of Canada's Arctic North. Two "senior officers" serials held each year ensure that staff officers of all three environments land, air and sea, are personally aware of the problems.

Headquarters and main support base for Exercise New Viking are at Churchill. Advanced bases during the winter are established at such points as Baker Lake, Coral Harbour, Rankin Inlet, Frobisher Bay and Yellowknife. In the summer, they are transferred to Sachs Harbour, Mould Bay, Isachsen, Rae Point and Eureka.

Larger scale exercises in the North were conducted in both summer and winter. Exercise Northern Lancer took the Canadian Airborne Regiment to the Frobisher Bay

area, supported by elements of 5^e Groupe-ment de Combat. The 1st Battalion, The Royal Canadian Regiment was deployed in the Fort Churchill area during Exercise Northern Ramble.

The Canadian Forces continued construction of northern airfields. This joint DIAND/DND-funded program began in 1969 and will continue through until 1976. Engineers from 1 Construction Engineering Unit in Winnipeg provide planning support, supervision and some workers for the project. Local labour is used wherever possible at each site. In 1972 these 1 CEU personnel, augmented by engineers from various bases throughout Canada, completed construction of a 2,600-foot runway in Pangnirtung, on Baffin Island in the NWT. Field Engineers from 1 Airborne Field Squadron in Edmonton carried out runway construction at Whale Cove and Cape Dorset. These airstrips will be 4,000 feet long and are scheduled for completion in 1973 and summer 1976 respectively.

Planning began for the construction of a 300-foot single span bridge at Mile 237 of the Dempster Highway in the Yukon. A reconnaissance party inspected the site in September. This project is funded by DIAND, designed by DPW, and will be constructed by Canadian Forces Military Engineers.

A field survey by the Canadian Forces Mapping and Charting Establishment established mapping control for 120 map sheets around the following areas on Baffin Island, NWT: Igloodik, Cape Christian, Pangnirtung, Cape Dyer, Longstaff Bluff, Dewar Lakes, Broughton Island, Cape Hooper. The field party consisted of 13 people and was supported by two light helicopters.

As part of a joint Canada-US project to improve survey techniques, the Mapping and Charting Establishment also manned a satellite observation station at Frobisher Bay between October 1971 and March 1972.

The Canadian Rangers continued to be available for military functions such as land and coastal surveillance, to collect detailed information, to help in search and rescue missions, and particularly to provide experienced guides to other elements of the Canadian Forces when operating in the North. The recent study on the Canadian Rangers confirmed a continuing need for this force but recommended that, in the light of present conditions, change should be made to increase the effectiveness of the individual ranger. Proposals for reconstitution are being prepared for Government

approval. Northern Region Headquarters continued its field training exercises for rangers, and it is expected that the results will be used to help shape future training.

Air Forces

Air Transport Command activity in the North was essentially the same as that for 1971. C130E Hercules aircraft provide weekly air service to the Canadian Forces communications stations at Alert and Inuvik and the Northern Region Headquarters at Yellowknife.

Hercules aircraft of Air Transport Command also provide airlift for the annual supply of Alert, during which a total of 193 loads of fuel oil and general cargo were flown in, the flights staging through Thule.

The Twin Otter detachment at Northern Region Headquarters, Yellowknife has proved essential to improved communications for Canadian Forces in the North and adds greatly to understanding the work of Canada's armed forces in the North. The two aircraft are also an essential adjunct to the Canadian Forces search and rescue capability in the North.

Search and Rescue (SAR) for the whole of Canada is divided into four search and rescue regions (SRRs). Each region contains large areas that extend above 60° North.

Administrative control of the primary search and rescue resources in each SRR is the responsibility of Air Transport Command, but operational control is shared by both Maritime Commands and Air Transport Command.

The SAR organization conducted 107 searches for missing aircraft in Canada. There were six major searches conducted above 60° North which took over 3,100 hours of flying. Of these only one missing aircraft, with two persons on board, was not located.

One again CF5 tactical fighter aircraft of 433^e Escadrille Tactique de Combat, Bagotville, Quebec, flew Arctic exercise missions from Frobisher Bay during January and February. Aircraft of 434 Squadron, Cold Lake, Alberta, also participated in northern training, including tactical photographic reconnaissance on behalf of other government departments.

Providing a long-term military presence in the Arctic, the DEW Line consists of four main and 17 auxiliary radar sites which are strung across the Canadian Arctic from Cape Dyer in the east to Komakuk Beach near the Alaskan border.

The Air Reserves from 402 Squadron, Winnipeg, and 418 Squadron, Edmonton,

took part in several pollution surveys, as well as the charting of small settlements and Arctic airstrips. In an exercise termed "Flight North of the Ancient Bird", two Otter aircraft of 411 Squadron, Toronto, flew to Eureka on Ellesmere Island in mid-July. This marked the first time the Air Reserve had operated this far north.

Plans for 1973

Maritime Forces

Plans call for continuing the annual exercise in northern waters. Again, participating units will include surface and sub-surface ships, and VP and VS aircraft of the Maritime Command. Northern patrols will continue at a rate similar to 1972. Consistent with the primary tasks and resources now assigned, support will continue to be given to other federal departments and agencies to the greatest extent possible.

Land Forces

The New Viking series of exercises will continue. In addition several major environmental training exercises will be conducted out of Churchill and Resolute Bay.

Construction of the airfields at Whale Cove and Cape Dorset will resume in early June. A 4,000-foot strip will be started in June at Pond Inlet. Whale Cove will be finished in late August, and at that time personnel and material will be moved to Eskimo Point to begin construction on another 4,000-foot airstrip.

Air Forces

Hercules aircraft will continue to fly regularly to Alert and Inuvik and Hercules and Buffalo aircraft will be used extensively in support of environmental training of land forces. Two Twin Otter aircraft will continue to be flown from Yellowknife to serve Northern Region Headquarters.

Air Reserve Squadron Otter aircraft will conduct settlement and airfield surveys in the Arctic during the period mid-May to mid-June 1973.

DEFENCE RESEARCH BOARD

Responsibilities

To bring to the Canadian Armed Forces scientific knowledge and experience in solving problems associated with military operations in high latitudes, and to sponsor and undertake research projects aimed at acquiring such knowledge.

g-term Plans

Research will be conducted both in the laboratory and in the field. Almost every aspect of science is involved, and for convenience the work is categorized as follows:

Research on the effects of the environment on systems used by the Canadian Forces to generate and transmit information necessary to command control, and in the effects of the environment on the Canadian Armed Forces' ability to conduct operations in the North.

Research directed to protecting the soldier and his equipment from the environment.

Research directed to the protection of the environment from military operations.

Review of 1972 Operations

Research was conducted at the board's laboratories across the country; these studies were functional and multi-disciplinary. Because the broad work categories outlined overlap in several of these laboratories, the text that follows has not been organized with continual reference and credit to the performing research establishments. The following list is therefore provided to give some idea of the number of laboratories involved and the general field of interest.

Research Establishment Atlantic — Arctic acoustics).

Research Establishment Valcartier (Military engineering, remote sensing).

Research Establishment Ottawa — Effects of the environment on operations in the North, protection of the individual soldier, remote sensing, military radar and communications).

Research Analysis Establishment — Operational research).

Research and Civil Institute of Environmental Medicine — (Protection of the individual soldier, the effects of the environment on operations in the North, remote sensing).

Research Establishment Suffield — Military engineering, protection of the individual soldier).

Research Establishment Pacific — Arctic acoustics).

The board has also supported research in the North by means of grants and contracts to universities, non-government research organizations and, to a small degree, to the Canadian industry. Facilities and goods and services were provided to other government

agencies, and close collaboration was maintained with research and development agencies in other countries, especially the United States and Great Britain.

Effects of the environment on operations in the North

Work done was concerned with movement and mobility, and covered situations ranging from movement of men overland to the sailing of ships through the waters of the sub-arctic during summer.

On land there was considerable emphasis on short-term solutions to a host of small problems involving the protection and comfort of the individual soldier deployed in the North during the arctic winter. While these problems, concerned with proper ventilation and heating of tents, refueling and igniting of stoves, proper functioning of stoves, noise generated by stoves, spectacle frosting, face protection, etc., are individually small, the summed effects present a very large and disturbing influence on efficiency and comfort. The problems have been tackled under the aegis of a small ad hoc committee composed of DRB and Canadian Forces personnel. Inventive short-term solutions devised for these problems will be field tested during winter operations in 1973. In the meantime, a longer-term look at problems of shelter is proceeding along two lines: a thorough evaluation of available tent designs, including a number of experimental US and Canadian tents, and the development of a mobile shelter combining the soldier's moving platform and his living quarters in one piece of equipment. A mock-up of a mobile shelter for a two-man team was designed taking human engineering factors into consideration. Work on building the unit was begun in 1972. The logistic part of the unit has been mated to a commercially available off-road platform and the system will be tested at Churchill in the winter of 1973.

Studies continued on the movement of sea ice in channels of strategic-economic interest, and data were obtained on the movement of large ice floes through Robeson Channel. The floes were followed by tracking signals from radar transponders set out on the floes. The transponders were part of an instrument package containing a recording anemometer and sometimes a water-current meter to record driving forces in the environment. The data are being analysed, but some tracks were plotted by direct read-out. The data showed a steady net down-channel movement reflecting the net down-channel current and the fact that winds were

either also in this direction or of very low velocity most of the time. Water-current direction is influenced by semi-diurnal tides and this effect could be seen in the ice floe tracks. On one occasion, with high southeasterly up-channel winds, the ice changed direction to a course 90° to the down-channel axis and then to an up-channel course. The fastest floe tracked moved down channel at two knots.

Radarscope photography of the ice in Nares Strait continued during reconnaissance flights. Consolidation of ice occurred a month earlier than in the previous year. Successive observation trips showed the persistence of gross features in the ice into spring.

As in previous years, work on vehicle mobility was supported in universities by extramural grants and by contracts. This work included studies of soil-wheel interaction, the use of photogrammetry, codifying of terrain for military uses, and investigations of the physical properties of ground as regards bearing properties in northern areas of interest to Canadian Forces. A contract was also let with a representative of the Canadian off-road vehicle industry to supply results of contracted university laboratory work to practical vehicle design. As a result the contractor designed a grouser for a tracked vehicle operating on snow slopes that outperformed competitors on trials at Aspen, Colorado.

The possible long-term effects of environmental conditions such as climate changes on the mobility of Canadian Forces in the Arctic have been investigated by monitoring the interaction between climate and large permanent and semi-permanent ice masses in Ellesmere. A traverse was made of two small ice caps at Lincoln Bay which had been covered with a dust layer at the point of their minimum retreat in 1959. The accumulation and changes since then could be caused by a mean summer cooling of 1.5°C .

Investigation of ice drift will continue in 1973 with the gathering of further field data and the analysis of present data, and a start will be made on setting up a predictive model relating drift to the environmental driving forces. Monitoring of the equilibrium between ice masses and climate will continue at a low level on the basis of opportunity, and considerable extra direction will be given to vehicle mobility studies, particularly the problem of terrain classification.

Arctic acoustics

The main feature of DRB's investigation of acoustic propagation in the Arctic and the

factors interfering with, or degrading, the signal return was the cruise of *CNAV Quest* as far north as Thule. The exercise kept the ship north of the Arctic Circle from 22 August to 19 September and involved Canadian Forces Argus aircraft and the *USNS Sands*, the latter co-operating under the direction of the US Naval Underwater Systems Centre. The objectives of the first phase of the *Ouest* cruise to 8 September were to measure ambient sea noise, its level and direction in the Labrador Sea, Davis Strait and Baffin Bay, and to determine the propagating conditions of low-frequency sound in these same areas. The first part of this phase was a follow up on 1971 work that used air-dropped sonobuoys, with quieter, more directional ship-deployed systems. A by-product of the acoustics work was the oceanographic data from the large number of bathy-thermograph records down to 2,500 ft. taken along track. For the second phase of the *Quest* cruise a crew change occurred at Thule and from 8 to 19 September the ship on her trip south performed experiments with an experimental automated active sonar aimed at determining bottom, surface and volume reverberation, and back-scatter from ice and icebergs. The strengths of deep scattering layers were measured using a downward directional cone receiver and explosive sound sources.

Other acoustic work consisted of measurements on under-ice noise and measurements of ice and iceberg noises during exercise NORPLOY 72.

Plans for 1973 include continued acoustics work using air and surface platforms and bottom-mounted recording packages left for periods up to one year in channels of interest.

Remote sensing

DRB support to the Canadian Forces sensor evaluation program has continued with in-house and field experiments. The latter included a multi-sensor trial over a flight line from Kingston through Ottawa to Mont Tremblant with short extra legs over Montreal and the St. Lawrence Seaway. Sensors included two infrared line scanners, one with high thermal resolution and one with high spatial resolution, one real aperture sideways-looking airborne radar and one with synthetic aperture, and finally a high-resolution camera. Ground support for these exercises was provided by a number of co-operating universities and interpretation has included these plus other government

departments. Both winter and summer imagery was taken and the purpose of the work was to build up a library of characteristic imagery that would help in the assessment of arctic imagery.

Other measurements were made at Resolute using a two-dimensional scanning infrared "camera" to determine the contrast between possible targets and arctic backgrounds as well as to determine effects of the atmospheric path on transmission.

The topics investigated in the laboratory were concerned with the output of infrared devices. A digitizer which stabilizes the presentation from the two-dimensional infrared scanner so that a frame can be frozen for in-depth study was constructed. With this equipment 64 levels of textural difference can be resolved in the presentation. A second piece of work was the evaluation of line-scanning systems by determining the minimum resolvable temperature differential. This technique involved overflying a large target array made up of painted and unpainted metal sections in winter and determining the minimum section area producing a determinable temperature differential.

Plans for 1973 call for increased work to determine the effects of snow, blowing snow and ice crystals on infrared transmission as it affects remote sensing coupled with sensor exercise in the north.

Communications and military radar in the North

In 1972 a portable satellite terminal was used successfully on *HMCS Protecteur* during the northern deployment of ships to the Hudson Strait-Davis Strait area. The terminal provided trouble-free communications with the south during a period of communications blackout.

Two experimental sites were set up for propagation experiments connected with evaluating over-the-horizon radar for air surveillance in the North. The transmitting and receiving site was located at Hall Beach and the secondary receiving site at Cambridge Bay. Data Analysis has begun and the software for analysis is well advanced.

In 1973 propagation experiments and data analysis will continue.

Protection of the individual soldier from the environment

DRB's extramural research program was the source of most of the work on biting insects in the North. The use of juvenile

hormone for insect control, and investigation of possible replacements for DEET as repellent constituted the main purpose of this work. In-house activity consisted of: field trials of a commercial ultrasonic repellent device — found to be ineffective; development of protective clothing consisting of a polyurethane foam of large pore size topped by nylon netting in the form of a coverall and head cover, permeable to air, comfortable and protective against mosquito bites in swampy test areas; impregnated neck and wrist bracelets. The neck bracelets gave some face and head protection and the latter little or no protection to the hands.

Evaluation of clothing providing protection against the cold continued in collaboration with the Arctic Petroleum Operators Association. A DRB team visited several seismic and drilling sites to determine how the various types of clothing in use are adapted to arctic working conditions and APOA were supplied with a number of clothing ensembles consisting of modified and standard military cold weather clothing. The field visits have led to the conclusion that clothing systems being used by the crews are inadequate in several ways. In the second phase of this joint study, clothing modified to suit the needs of drilling crews (specially treated for oil and water repellency) and seismic crews will be tested.

Plans call for the above tests to be made during the winter of 1973.

On the physiological side a multi-facet study was begun on the whiteout problem. Quick-fix ideas included visual aids in the form of coloured plastic streamers dropped from the aircraft as man-made visual clues to help the pilots land more easily, as well as filters in the form of coloured glasses to increase contrast between "target" and background. Longer-term solutions involve testing pilots to see if myopia is involved in vision loss under whiteout conditions, as well as the testing of an optical device that projects a dot in front of the pilot at infinity. The dot gives the pilot something to look at instead of relaxing his eyes at a fixed focus a few feet in front of him.

Work on frostbite susceptibility continued with a considerable amount of data being gathered from Canadian Forces Exercises. A frostbite susceptibility index based on a simple test involving immersion of the subject's hand in ice water and noting the cooling characteristics of the hand, may be correlateable with frostbite incidence and could be useful. In 1973 DRB scientists participate in five Canadian Forces New

ing training exercises in the North to further investigate frostbite incidence and develop a susceptibility index. This work investigates the popularly held notion that dry increases susceptibility, but to date no idea has not been proven.

The effectiveness of vitamin C in combat against respiratory infections in troops after arrival in the North in winter had been proven. With an intake of 1 gm per day there were less complaints of sniffles, running noses, etc.

There are continuing studies on dehydration and the problems it causes in loss of effectiveness. The dehydration problem is the result of a deliberate cut back in fluid intake to avoid voiding in extreme cold. The vitamin and dehydration work will continue in 1973.

The work of protecting troops in the North against infectious diseases continued. Blood samples taken from troops proceeding to new Viking training were examined before and after going north. The project will continue until September 1973. As part of the study northern animals and insects are examined as possible disease vectors. Blood samples taken from animals at Yellowknife were tested negative, and the work with insects will begin in 1973.

military engineering

A wide variety of topics under this heading are being investigated at DRB establishments with support from outside agencies. The latter are concerned with the possible construction of roads, runways, helipads, buildings in areas of permafrost, the clearing of organic terrain, the possible use of locally available materials for construction and waste disposal systems.

House work was concerned with continued research on penetrometers to allow calibration of instruments and other probes on sea ice, the problems of static electricity in clothing, the performance of batteries at low temperatures, noise studies on off-road vehicles, the use of a heated blanket for working on machinery in the North, and a continued investigation of slurry explosives.

The ice penetrometer investigated used a core of heavy metal surrounded by a water-tight metal such as lithium.

Static electricity in clothing can build up charges as high as 10 kilovolts in low-humidity northern atmospheres and can be a potential hazard in such operations as refueling. Discharge from provided sharp points was only partially successful. Another

approach investigated was the use of a warning device to inform the wearer that he carried a potentially hazardous charge and should take steps to remove it.

The use of slurry explosives for construction in frozen ground involved testing a number of different types, with one being selected for application to military engineering.

The operation of a 300-watt hydrazine-air fuel cell at temperatures down to -40°C was studied. At this low temperature the cell could be activated without problems, provided air at room temperature was used. Studies of the low-temperature behaviour of metal-air batteries were also made.

The monitoring of noise from off-road vehicles is aimed at assessing hearing impairment suffered by persons who have used snowmobiles for prolonged periods. After initial evaluation of some of the better-rated machines, the noise level will be checked following a period of use.

The heated sleeve combines a wind screen with an electrically heated sleeve covering the arm from the wrist to the elbow. In early 1973 the combination of sleeve and wind screen will be tested for aircraft and vehicle maintenance in the North.

Plans for 1973 call for continued study of low-temperature battery performance, vehicle noise problems, and other aspects of Canadian Forces military engineering needing research.

Protection of the environment from military operations

Most of the work under this heading is done by outside agencies and is concerned with the effects of disturbing ground and ground cover.

Operational research

Operational research on a replacement for the current surveillance platforms used in gathering data in the North continued, along with studies of military operations in the Canadian Arctic. A study of search and rescue operations was begun with the convening of a conference to discuss problems. Some of the immediate tasks are to analyse statistical data to determine the effectiveness of the emergency locating transmitter (ELT) and the cost of operating the present search and rescue system. It is expected that effort on both problems will receive special attention in 1973.

Plans for 1973

From the numerous references under specific headings to plans for the immediate

future it can be deduced that work in 1973 will in many cases be an extension of work begun or already under way in 1972, bearing in mind, however, the need to keep activities relevant to the long-term plans.

1973 Contracts

- With McGill University for research on ice physics, with special reference to the study of sea ice.
- With McGill University to assist DRB in the studies of ice drift in Robeson Channel.
- With the Arctic Institute of North America to provide limited consultative services.
- With McGill University for a terrain evaluation study and classification for mobility.
- With McGill University for a study of soil-wheel interaction in the use of off-road vehicles.
- With Queen's University for research on the susceptibility of black flies to DDT, including field residues.
- With Marconi Company to develop transmission buoys to study ice drift in northern waters.

UNIVERSITY GRANTS PROGRAM

Entomological Research

NAME	PROGRAM \$	UNIVERSITY	TITLE OF RESEARCH PROJ.
BENNETT, G.F.	2500	Memorial	Mermithoid parasites of black-flies
DOWNER, R.G.H.	6000	Waterloo	Juvenile hormone for mosquito control
FRIEND, W.G.	7000	Toronto	A study of the gorging response in blood-feeding insects
MASAMUNE, S.	6200	Alberta	Synthesis of insect hormones: new pesticides
McIVER, S.B.	5200	Toronto	Structure of mosquito sensory receptors
MORRISON, F.O.	4000	MacDonald College (McGill)	Dynamics and morphology of the biting midge
ORR, D.E.	4700	Lakehead	Blackfly control by chemical methods
SMITH, S.M.	4500	Waterloo	The control of Northern mosquitoes by mermithoid parasites

Geophysical Research

ASHIKIAN, B.	6000	Sherbrooke	Conversion of wind energy into thermal energy
BENEDICT, C.P.	5000	Memorial	Iceberg cross-section echo
BONN, F.	4000	Sherbrooke	Distance detection by infra-red radiometry of terrain and vegetation
BUNTING, B.T.	5000	McMaster	Soil characteristics, terrain mapping and terrain analysis in the Arctic

Geophysical Research

COLLINS, S.H.	13,000	Guelph	Orthophoto development
DERENYI, E.E.	8000	New Brunswick	Orientation problems with unorthodox imagery in air space systems
DORRER, E.	5500	New Brunswick	Panoramic photography analysis on the analytical plotter AP/2C
HOLLINGSHEAD, G.W.	8000	Royal Military College	Evaluation and stabilization of highly compressible terrain for use as V/STOL landing sites
HOWARTH, P.J.	6000	McMaster	Photo-interpretation and mapping in Resolute area
KENN, M.J.	8000	Dalhousie	Geophysical studies in Baffin Bay
KROUSE, H.R.	5000	Calgary	Isotopic studies of glaciers and high-altitude precipitation
LANGLEBEN, M.P.	5800	McGill	Measurement of water-drag coefficient of an ice cover
LOVE, H.W.	7500	Arctic Institute of North America	Baffin Bay North Water Project
MASRY, S.E.	5500	New Brunswick	Rectification of infra-red imagery using the analytical plotter
MITCHELL, R.J.	4000	Queen's	Strength of frozen soils
McCANN, S.B.	5500	McMaster	An investigation of beach characteristics in the Arctic
OSLER, J.C.	5000	McGill	Engineering properties of frozen soil
RADFORTH, N.W.	5000	New Brunswick	A national inventory for muskeg types
RAYMOND, G.P.	4000	Queen's	Stability of airfield and foundation pads on muskeg
TANGUAY, M.G.	10,000	École Polytechnique Montréal	Use of infra-red imagery for surveying in the eastern part of North America
THURTELL, G.W.	10,000	Guelph	Pressure-sphere anemometer for Arctic use
WILSON, N.E.	6000	McMaster	Shear strength characteristics of soft soils under repeated loads

Medical Research

WILT, J.C.	11,700	Manitoba	Relevance of psittacosis — L.G.V. antibodies in residents of the Arctic
ALEKSIUK, M.	5000	Manitoba	The effects of temperature, energy availability and hypoxia on bioenergetics and metabolism in cold-climate mammals
CHIN, A.K.	8650	York	Physical fitness and adaption to cold and altitude stresses
COOPER, K.E.	6500	Calgary	Cold water immersion, arterial blood pCO ₂ and brain blood flow
JOHNSON, G.E.	10,800	Toronto	Regulation of heat production
LeBLANC, J.	5350	Laval	Assessment of cold reactivity by automatic nervous system responses

DEPARTMENT OF NATIONAL HEALTH AND WELFARE (NH & W)

HEALTH PROGRAMS BRANCH

Responsibilities

To make high quality health services accessible to all residents of Canada regardless of their place of residence or ability to pay. The branch administers the Hospital Insurance and Diagnostic Services Act (implemented in 1958) and the Medical Care Act (implemented in 1968). Under these Acts the federal government contributes an average of half the cost of the services provided by provincial and Territorial hospital insurance plans and medical care insurance plans. For its participation the federal government has laid down the following criteria:

- the insured services must be comprehensive,
- the coverage must be universal and must be provided under equal terms and conditions to all eligible residents,
- the coverage must be portable when an insured person is temporarily absent or moves to another province or Territory, and
- the plan must be non-profit and administered by a public authority.

The federal legislation gives each province and Territory considerable latitude in determining administrative arrangements for the operation of its plans, in deciding how to finance its own share of the costs (e.g. through premiums, sales tax, other provincial revenues or by a combination of methods), in deciding whether coverage will be voluntary or compulsory, and whether or not services additional to those of the national programs will be included in the provincial plans. Any additional benefits are, of course, not eligible for cost-sharing.

In 1971-72 the federal government's share of the provincial and Territorial hospital insurance plans was \$1,201 million. The estimated* federal contribution to the Yukon was \$816,691, or 69 per cent of the cost of insured services of the national program covered by the Yukon Hospital Insurance Plan. The corresponding figures for the Northwest Territories Hospital Insurance Plan were \$1,834,922 or 51 per cent.

In 1971-72 the federal government contribution under the Medical Care Program to the various provincial medical care insurance plans and for the plan in the Northwest Territories was \$586 million. The Northwest Territories joined the program on 1 April 1971. The federal contribution to the Northwest Territories was \$956,000. Due to the delay between the date of service rendered and the date of payment by the plan, less than 12 months costs are included in the fiscal year. On a normalized basis approximately 60 per cent of the cost would be shared by the federal government. The Yukon Territory joined the plan on 1 April 1972. The estimated contribution by the federal government during 1971-72 will be \$486,000 towards an estimated cost for the Yukon plan of \$950,000.

The branch is also responsible for managing the Health Resources Fund which was established in 1966 in the amount of \$500 million to be spent over the following 15 years. The fund will help the provinces meet nation-wide needs for new and improved facilities to educate health personnel, and for research. Another major responsibility is the administration of a growing program of health grants for research and innovation in methods of providing health care. The branch also has a major economics

* pending final calculations

and statistical directorate to provide support for economic and social research necessary to health policy planning and development.

The branch provides the provinces and Territories with consultant services, both in connection with their health insurance plans and also to help them plan and carry out changes in their system for providing health care.

Review of 1972 Operations

The Yukon Health Care Insurance Plan was implemented on 1 April 1972. As of that date all provinces and Territories had plans in effect under the medical care program. The federal government continues to discuss with the provinces ways and means of improving flexibility in the federal-provincial arrangements, with particular emphasis on promoting a more efficient economic health care system.

Plans for 1973

Effective 1 April 1973, the Medical Services Directorate and the Hospital Insurance and Diagnostic Services Directorate will amalgamate and be known as the Health Insurance Directorate. The federal government will continue to provide financial support, consultation, and advisory and research support to the provinces and Territories.

MEDICAL SERVICES — NORTHERN REGION

Responsibilities

Through its Northern Health Services Medical Services Branch of the Department of National Health and Welfare is responsible for developing and delivering total health care in the North. It performs the operational and management functions of a department of health in each of the Territories.

addition to its purely federal health responsibilities towards all northern residents. Health ordinances are enacted by Territorial Councils in response to local needs, having regard to professional and technical advice furnished by Medical Services Branch.

The governments of the Yukon and the Northwest Territories manage and operate health insurance plans similar to those in the other provinces of Canada.

Long-term Plans

The attainment of objectives will require a high level of participation by northern community populations in activities necessary to improve life styles, the environment, organized health care and research. Health depends in large measure on socio-economic conditions which in the North are related to a community's ability to adjust itself to an optimum level in relation to employment opportunities and local resources. Health adjustment is accomplished by family planning and migration. There will be increased emphasis on measures designed to enable northern residents to take the steps necessary to improve quality of life. Further training programs will be developed for northern residents to increase their employment in the health professions.

Review of 1972 Operations

Projects

Dental therapists' school, Fort Smith

A new training program for dental therapists was commenced in September 1972 at Fort Smith, NWT.

Upon completing two years of training, graduates will be qualified as dental therapists and employed to provide preventive and educational dental services. They will carry out restorative treatment to sound teeth and uncomplicated procedures for the removal of primary teeth. All these services will be provided under the direction of a field dental officer.

An experimental protocol aimed at eradicating tuberculosis by selective mass chemotherapy was carried on during 1972 in Pelly Bay and Eskimo Point.

Clinical training of nurses

During the past year twelve nurses returning to work in the northern region have completed one of the clinical training courses. The courses are designed specifically to provide nurses with the clinical competence needed to perform satisfactorily in the expanded role required in areas where there

are no resident physicians. A further seven nurses are enrolled in clinical training courses at two universities (Alberta and McGill) in 1973. These in-service staff development courses are provided through the co-operation of six Canadian universities working in close collaboration with the Medical Services Branch. The course is four months long, preceded by an orientation period of prescribed field experience of two months.

The northern region sponsors a limited number of nurses interested in taking an out-post nursing course at Dalhousie University. This course is twenty months long. Graduates are qualified in community health (public health) nursing, midwifery and — through assistance from the medical school faculty — have acquired a significant body of knowledge in basic paediatrics, medicine and surgery suited to the needs of the outpost nurse. Five northern region nurses have completed this course.

Competence in assessing clinical situations is emphasized in both courses.

Accomplishment maternal and child health

An "At Risk" Register was commenced.

Observations suggest that an intensive public health nursing program to "at risk" infants lowers morbidity and mortality.

Projects continued during 1972

Medical problems

A trial of gonorrhea vaccine was continued and blood samples continued to be collected.

Activities initiated or completed in 1972

A final series of physical and laboratory examinations was carried out in Igloodik within the framework of the multi-disciplinary international biology program — human adaptability studies of circumpolar peoples, in May 1972.

Work on carbohydrate metabolism in Eskimos and the influence of preceding meat meals was finalized and presented at the International Nutrition Congress and published in the Canadian Medical Association Journal.

Facilities

Activities initiated or completed in 1972

N.W.T.

Pangnirtung — completion of interim nursing station

Pelly Bay — construction of nursing station

Nahanni Butte — construction of health station

Hay River — relocation of health center

Fort Simpson — construction of 12-bed hospital — health center complex

Yukon

Carmacks — installation of trailer health centre

Burwash Landing — installation of trailer health centre

Whitehorse — relocation of zone office

Whitehorse — relocation of public health office

Personnel problems

The high turnover of staff, including nurses, continued as a serious problem in the provision of health services. Shortage of medical practitioners was less acute, with most positions for medical officers being filled.

Plans for 1973

Extensions of eye research

Consideration is being given to the provision of financial support of new epidemiological research oriented towards eye diseases. This will be conducted by University based workers with the objective of gaining more information on the physiology, etiology and pathology of refractive errors in Eskimos in selected northern settlements.

Continuing Project

As of February 1973 the Public Health Engineer will be located at the office in Yellowknife.

Continuing Project

Medical Problems

As planned in the trial of gonorrhea vaccine, the collection and testing of blood samples will be continued during this year.

There will be continuing involvement in Medical epidemiological aspects of the International Biology Programme. Many detailed studies will have to be worked up for publication.

Plans for the Third International Symposium on Circumpolar Health will be developed.

The study of Isoniazid Matrix preparations in an effort to find efficient and safe ambulant TB treatment for fast Isoniazid inactivators will be concluded. Almost 100% of Eskimos and 65% of Indians tested were found to be fast inactivators of Isoniazid. A study of Cardio-pulmonary pathology connected with exertion in extremely cold air

will be concluded, Epidemiological studies into changing incidence of neoplastic diseases in Eskimos will be continued.

A study of Alcohol-related disease and death in Northern populations is also in progress.

There are also continuing studies into pathogenic factors leading to the development of Amoebic Dysentery.

Facilities Planned

N.W.T.

- Pangnirtung — design and pre-engineering survey for new nursing station
- Cape Dorset — installation of transient quarters
- Frobisher Bay — planning & engineering for general hospital expansion
- Rankin Inlet — nursing station expansion
- Inuvik — hospital expansion — construction of new paediatrics ward and improved out-patient facilities
- Norman Wells — engineering studies for new nursing station

Yukon

- Watson Lake — construction of replacement nursing station
- Destruction Bay — installation of small nursing station
- Pelly Crossing — conversion of health station to nursing station

SOCIAL ALLOWANCES AND SERVICES BRANCH

Canada Assistance Plan

The Canada Assistance Plan was enacted in 1966 to support the integration, broadening and improvement of the public assistance programs of the provinces and Territories and their municipalities, and to encourage the extension and development of welfare services. Under the plan contributions amounting to fifty per cent of shareable costs are made toward provincial, Territorial and municipal expenditures for public assistance and welfare services.

By August 1967 all provinces had signed agreements under Part I. The Yukon Territory signed in December 1969 and the Northwest Territories in February 1973.

The Canada Assistance Plan has two primary objectives: to help provide adequate assistance to persons in need, and to encourage the development and extension of welfare services intended to prevent and remove the causes of poverty and dependence on public assistance.

Under Part III of the plan provision is also made for special work programs to help improve the motivation and work capacity of persons who have been unable to take full advantage of training, or who have unusual difficulty finding or keeping a job.

In addition to the cost-sharing arrangements the CAP directorate makes available to the provinces and Territories, at their request, consultant services in areas such as income support, day care, child welfare, institutional care and community development. In 1972 an information centre was established in Ottawa to answer questions on all aspects of day care.

Expenditures under the CAP in the Yukon Territory

1971-72	1972-73 Estimate	1973-74 Forecast
\$295,872	\$1,020,000	\$1,300,000

Expenditures under the CAP in the Northwest Territories

1973-74 Forecast
\$1,800,000

Other welfare programs

Before agreements were made under the Canada Assistance Plan, the federal government contributed to the provinces and Territories 50 per cent of the payments made under the Unemployment Assistance Act passed in 1956 and amended in 1957.

Under this Act expenditures in the Northwest Territories were as follows:

1971-72	1972-73 Estimate
\$1,009,839	\$1,280,000

As the CAP agreement with the NWT supercedes the agreement under the Unemployment Assistance Act, there will be no future expenditures under the Act, and a portion of the 1972-73 costs will actually be paid under the CAP.

The federal government has entered into agreements with both the Yukon Territory and the Northwest Territories under the Blind Persons Act and the Disabled Persons Act. The Blind Persons Act provides for federal contributions of 75 per cent of the amounts paid by the provinces or Territories for allowances, up to a maximum of \$75 a month, to blind persons 18 years of age and

over who are eligible for such payments on the basis of a means test. The Disabled Persons Act provides for federal payment of 50 per cent of the amount up to \$75 a month paid by a province or territory to disabled persons aged 18 or over who qualify under a means test. Both of these categories of programs are being phased out. Many of the recipients of these allowances will receive some assistance under the general assistance programs of the provinces and Territories; these expenditures will be eligible for cost sharing under the more comprehensive provisions of the CAP.

Blind Persons Allowances

	1971-72	1972-73 Estimates
N.W.T.	\$17,089	\$19,389
Y.T.	2,981	3,037

Disabled Persons Allowances

	1971-72	1972-73 Estimates
N.W.T.	\$15,830	\$14,100
Y.T.	2,587	2,200

Family planning

The Family Planning Division was created in 1972 to enable all Canadians to make responsible and informed decisions about the number and the spacing of their children. Family Planning Grants are available to inform Canadians about the purpose and methods of family planning, to train health and welfare professionals and other staff involved in family planning services, and to conduct research in family planning.

In 1972 a family planning grant of \$25,000 was awarded to the Northwest Territories Family Planning Association for planning and operational purposes and for the preparation of family planning literature in the Eskimo language.

DEPARTMENT OF NATIONAL REVENUE (NR)

TOMTS AND EXCISE

Responsibilities

to administer the customs and excise laws and regulations, particularly with regard to the movement of aircraft and vessels.

Long-term Plans

to maintain the present level of customs service in the North, and to increase service where it is evident that continuing development will require customs surveillance.

Review of 1972 Operations

The local Port of Whitehorse, under the supervision of the District Port of Vancouver, continues to administer customs laws and regulations throughout the Yukon Territory. The Territory is served by all modern forms of transportation engaged in the import and export of goods and the international movement of passengers. To accommodate this service, there are customs outposts at Beaver Creek, Carcross, Dawson, Old Crow and Inuvik Camp. Customs formalities at Old Crow are performed by the RCMP. Six locations were approved as customs airports of refuge and service was provided for sufferwarehouse at Whitehorse and Dawson. On 72 hours notice, the port of Edmonton provides service to a vessel reefering station for aircraft at Yellowknife, and maintains an enforcement outpost at Inuvik, NWT. Service at Yellowknife is provided by officers from Edmonton on an "all" basis. Service for Inuvik is provided by a local resident who is employed full-time. The RCMP continue to provide service at Frobisher Bay, NWT, an outpost under the jurisdiction of the Port of Goose Bay, Newfoundland, which is administered by the District Port of St. John's.

During the year there was a great increase in commercial exploration for oil deposits and in such non-commercial activities as geographical and mountaineering expeditions. Oil exploration, with the attendant increase in cargo deliveries to northern areas, necessitated closer surveillance by customs personnel. Interest arises from the need to levy duty on imported goods and to assess the adequacy of reporting and accounting procedures. An officer from the Port of Edmonton made several journeys into the Territories to examine these aspects of the department's work.

During the past year there was a considerable increase in cargo deliveries by vessels. At least two vessels made two voyages each to deliver supplies for oil exploration and a supply ship delivered stocks of fuel oil to various points on Melville Island. In all, more than twenty vessels were engaged in various cargo movements, and the Canadian icebreaker *Sir John A. MacDonald* was frequently seen in this area. Special recognition is due to the members of the RCMP and government departments performing customs duties on behalf of this department.

With the above exceptions, customs service in the North for places under the jurisdiction of the ports of Whitehorse, Edmonton, and Goose Bay is provided by employees of other departments and services.

Royal Canadian Mounted Police

Baker Lake
Cambridge Bay
Cape Christian
Coppermine
Eskimo Point
Lake Harbour

Pangnirtung
Pond Inlet
Resolute Bay
Sachs Harbour
Spence Bay
Tuktoyaktuk

Department of National Defence

Cape Dyer

Department of Transport

Coral Harbour

Department of the Environment

Alert
Eureka

Isachsen
Mould Bay

Plans for 1973

Due to the rapid increase in commercial activity in the territories and the Arctic archipelago, the need to improve customs control in this area is being re-examined.

Revenue & Expenditure 1971/72

Port	Revenue	Expenditure
Whitehorse	405,115	205,700

With the exception of the Yukon Territory all customs offices in the territories are accountable to financial responsibility centres at customs ports in the provinces.

Taxation Component

For the convenience of taxpayers and the most economical operation of Canada's self-assessment income tax system, the taxation component has 28 district offices in Canada linked to the head office and data centre in Ottawa. The Yukon is served by the district office in Vancouver; the Northwest Territories by Edmonton; the eastern Arctic by Quebec, Labrador is part of the Territory served by the St. John's, Newfoundland district office. In addition to federal income tax, the department collects Canada Pension Plan contributions and premiums under the Unemployment Insurance Act.

DEPARTMENT OF PUBLIC WORKS (DPW)

Responsibilities

The Department of Public Works, the principal construction arm of the federal government, undertakes a wide range of construction and maintenance work in the North, usually at the request of other government departments having responsibilities in the North. The department provides architectural, engineering and construction services, and assists in planning, site investigation, economic feasibility studies, design, as well as construction and management of buildings, public utilities, highways, harbors and wharves. It is also responsible for the acquisition and disposal of lands and properties, for the leasing of office and other space when Crown-owned space is not available, and for the upkeep of a great number of federal buildings in the North.

Public Works has continuing responsibility for the development and maintenance of navigable waterways in the North. It is also responsible for the construction and upkeep of the northwest highway system, including the Alaska Highway and the Haines Road. (In April 1972 maintenance work on the portion of the Alaska Highway and Haines Road in the Yukon Territory was undertaken by the Territorial government). The department provides an engineering service to the Department of Indian Affairs and Northern Development for the location, design and construction of roads under the northern roads program, which includes two major northern links — the Dempster and Mackenzie highways.

Accommodation, construction, marine and highway operations in the North are the responsibility of the department's regional directors in the Pacific, Western and Quebec regions.

Pacific Region (Yukon Territory)

1972 Accommodation Operations

Public Works completed another busy year in its role of providing accommodation to other government departments, Crown Agencies and the Yukon Territory government to meet office, warehouse and northern pool housing needs.

Improvements were made to northern pool housing and extensive preventive maintenance was done in the Whitehorse and Fort Nelson areas.

A new post office and postmaster's residence was built in Cassiar, B.C., and new leased accommodation was provided for the post office in Watson Lake at Mile 635 on the Alaska Highway.

In Whitehorse numerous renovations and changes in Crown-owned buildings, in addition to leased office space in the private sector, were carried out to meet the needs of other government departments for office and warehouse accommodation.

The Takhini and Valleyview subdivisions of Whitehorse were connected to the city's new water supply system, eliminating use of the outdated McIntyre Creek water system.

Accommodation Plans for 1973

The department will continue to operate and maintain general purpose federal government buildings, provide space for post offices, and administer and maintain northern pool housing. Building maintenance services for certain government departments and the RCMP will continue.

1972 Highway Operations

Responsibility for routine maintenance of the Alaska Highway west of the British Columbia — Yukon border (Mile 626) and of the Haines Road was transferred to the Government of the Yukon Territory on 1 April 1972. At the same time 130 Public

Works employees transferred to the Yukon Public Service. In addition all associated equipment, materials and buildings were turned over to the Territorial government as part of the highway transfer. The Department of Public Works is still financially responsible for maintaining the Alaska Highway and the Haines Road. Maintenance of the B.C. section (Miles 83 to 626) is carried out directly by Public Works through three commercial contracts.

During 1972 the bridge replacement and strengthening program continued. The swing bridges and portals of the Upper Rancheria Big Creek, Little Rancheria and Duke River bridges were modified to provide 18-foot minimum clearances. The deck was replaced on the Little Rancheria bridge, and the Beaton River and Raspberry Creek bridges were replaced with new structures.

Work on the approved program to reconstruct and pave the Alaska Highway within settled areas was continued, with the paving of the highway through the settlement of Watson Lake, Miles 630 to 637.

The program to improve sections of the Alaska Highway was started with the award of a two-year contract for reconstruction of Miles 206 to 230.

The department continued to provide engineering services to the Department of Indian Affairs and Northern Development in support of their Northern Roads Program. During 1972 work on their behalf concentrated on the location, design and construction of the Dempster Highway. Construction of Miles 123 to 166 was completed. Work also began on the section from Mile 166 to 178, and the design plans for Miles 178 to 290 were completed in preparation for tender call. A study of the effect of the highway on the environment was conducted and completed in 1972.

Highway Plans for 1973

The agreement reached 1 April 1972 between the federal and Yukon governments will continue in 1973. Public Works will continue to be directly responsible for maintaining the B.C. section, and for new construction on the entire route.

Bridge improvement on the Northwest Highway System will continue, with the replacement of the Beaver River bridge, the Hogg Creek bridge and the Muskwa River bridge. In addition, work will be done to strengthen the Big Creek, the Lower and Upper Liard bridges and the Yukon River bridge.

Miles 83 to 93 of the Alaska Highway will be reconstructed and paved as a part of the continuing program of reconstruction and widening of the highway in settled areas. The contract for reconstruction from Mile 206 to 237 started in 1972 and will be continued. Highway design and right-of-way clearing will be carried out along Miles 230 to 299 in anticipation of future reconstruction.

Public Works will supervise completion of reconstruction of 12 miles of the Dempster Highway to Mile 178, and the start of construction from Mile 178 to 237. The contract for the construction of the balance of the Dempster Highway within the Yukon Territory, that is, Miles 237 to 290, will likely be awarded during the summer months to the successful contractor to move onto the site over the winter road system and commence construction in 1974.

Western Region

Accommodation Operations

The northern housing program to accommodate federal public servants continued in 1972 with additional housing being completed in Fort Simpson, Inuvik and Yellowknife in the Northwest Territories. Housing construction was started in Hay River, NWT, as well as more in Inuvik and Yellowknife. A new post office and a magnetic observatory for the Department of Energy, Mines and Resources were completed in Cambridge Bay, NWT. An extension to the Energy, Mines and Resources seismology laboratory in Yellowknife was begun in 1972, and will be completed in 1973.

A 15-bed hospital for the Department of National Health and Welfare in Fort Simpson and a medical health centre in Norway House, Manitoba, were under construction in 1972. A number of projects were carried out for the R.C.M.P. Construction on a detachment redevelopment in La Loche, Saskatchewan was started, and a major complex at

Norway House, Manitoba was completed. A workshop for the R.C.M.P. was built in Fort McPherson, NWT.

Extensions to existing buildings were constructed at CFB Inuvik for the Department of National Defence. In Yellowknife a hangar was completed for the joint use of National Defence and the R.C.M.P.

Public Works carried out construction of schools for the Department of Indian and Northern Affairs in isolated areas of Manitoba at God's Narrows, Fisher River, Nelson House and Split Lake.

The federal government is cooperating with the Province of Manitoba to make possible a viable community complex at Churchill, Manitoba. The facility at Fort Churchill which previously served the needs of the federal government in the area is being phased out. The Department of Public Works has been charged with the responsibility of providing within the new town all the necessary functions previously performed at Fort Churchill. Design and construction of the new community is being handled by the Municipal Planning Branch of the Manitoba Municipal Affairs Department, with professional and technical assistance from Public Works.

Construction was carried out in 1972, for completion in early 1973, on a sewer and water distribution system, including a water reservoir, a pumping station and a sewage treatment plant.

Accommodation Plans for 1973

Construction of housing will continue to be a major activity in 1973, with additional housing proposed for Fort Simpson, Hay River, Inuvik, Pine Point, Fort Smith and Yellowknife in the Northwest Territories. The proposed expansion of the General Hospital in Inuvik was cancelled in 1972 following receipt of tenders. It is expected, however, that this project will be reactivated in 1973. Alterations will also be carried out to the clinic building in Fort Simpson.

Projects for the R.C.M.P. are proposed for Fort Liard, Fort Providence and Norman Wells, NWT. Scheduled for 1973 are detachments at Buffalo Narrows, Cumberland House and Stony Rapids as well as patrol cabins at Nelson House and Sherridon, Manitoba. Construction is expected to get underway in 1973 on a new school for Indian and Northern Affairs at Oxford House, Manitoba.

In Churchill, Manitoba construction of a major commercial complex, to include a school, recreational facilities, hospital and

municipal offices, will commence early in 1973.

1972 Highway Operations

Substantial progress was made during the year in the difficult Mackenzie Delta portion of the Dempster and Mackenzie Highways. Work has proceeded continuously except during the most severe winter months, mid-December to mid-February, with the strictest methods of construction control to preserve the natural permafrost foundation. A 7.1 million dollar contract was awarded in August for grading and drainage of the last 40 miles of the interconnecting link between the Delta communities and Fort McPherson, Arctic Red River and Inuvik. Completion of this difficult phase is expected by the end of 1974.

Following the announcement by the Prime Minister on 28 April 1972, that construction of over 600 miles of the Mackenzie Highway from Fort Simpson to Arctic Red River would be accelerated, the Department of Public Works began to mobilize the resources required for reconnaissance and preliminary engineering. By the end of July, trailer camps for base operations had been established at Fort Simpson, at Willow Lake River some 100 miles north of Fort Simpson, and at Blackwater River another 100 miles farther north. Preliminary departmental engineering was carried out involving the employment of 22 man-years of continuing full-time staff and 85 man-years of project-term staff.

A preliminary alignment was established on the ground between Fort Simpson at Mile 300 and Fort Good Hope at Mile 725. Additional trailer camps were established at Norman Wells and Fort Good Hope. At the peak of activities 125 to 150 people were employed, of which 40 per cent were natives. Construction began with the award of a contract for 50 miles of grading north from Fort Simpson. The Department also commissioned 20 consulting firms to undertake environmental studies, geotechnical investigations, hydrological data collection, bridge designs and survey assistance.

Highway Plans for 1973

Preliminary engineering, design and environmental studies will continue in 1973 over the entire section of the Mackenzie Highway between Fort Simpson and Arctic Red River. Design and construction of the highway from Fort Simpson to Tuktoyaktuk on the Arctic Coast will proceed with the objective of completing a passable road to the Dempster/Mackenzie junction by the fall of

1976. Concurrently, work will continue on the design of approximately 52 miles of the Dempster Highway from Fort McPherson to the Yukon border. It is expected that a grading contract will be awarded for this portion by the fall of 1973. Minor work will be undertaken during the year for improvements to the ferry approaches where the Mackenzie Highway crosses the Liard River at Fort Simpson.

1972 Marine Operations

Existing wharves at Buffalo Narrows, Saskatchewan and Fort Resolution, N.W.T. were reconstructed in 1972, and the wharf at Fort Chipewyan, Alberta was extended. A new deck was built on the wharf at Yellowknife. The ferry, M.H. "Merv Hardie", was put into service at Fort Providence, and a wharf was constructed at Reindeer Lake, Saskatchewan at the terminus of Highway 102. Minor repairs and annual maintenance were carried out on the floating wharves serving settlements on the Mackenzie River and on fixed structures at other locations.

The potamology study of the Mackenzie River was essentially completed in 1972. Two crews involving 31 men conducted surveys on the river from Great Slave Lake to Fort Good Hope. Detailed engineering and hydrographic surveys, including borings and levelling, were completed along 110 miles of the river.

The department provided logistic support and other assistance to the Ministry of Transport for their studies of the use of air-cushion ferries at Tuktoyaktuk. At the request of the Territorial Government, Public Works began preliminary studies into the problem of shore erosion near Tuktoyaktuk.

Suction dredging to improve the natural channel was carried out on the upper reaches of the Mackenzie River during 1972. Maintenance operations and minor improvements were provided at Hay River and at the Sans Sault Rapids.

The Department of Public Works was represented on the Peace-Athabasca Delta study and was actively involved on its technical advisory committee. All financial administrative details for the study were handled by the department.

Marine Plans for 1973

A new haul-out facility to serve the "Merv Hardie" ferry at Fort Providence will be constructed in 1973. The need for further information on the Mackenzie River will require that the survey program be extended during 1973.

Public Works will make a report of its findings to the Northwest Territories government concerning the shore erosion at Tuktoyaktuk, and it is expected that shore protection work will be carried out later in the year.

Quebec Region

1972 Accommodation Operations

During 1972, no projects were carried out by Public Works in the northern-most areas of Quebec. The one project planned for the year, a school at Great Whale River for the Department of Indian Affairs and Northern Development, was cancelled by that Department before the construction stage.

Accommodation Plans for 1973

Public Works will build an aircraft hangar with office and storage space for the R.C.M.P. at Frobisher Bay, NWT. During 1973 construction will proceed on a National Health and Welfare medical station at Pangnirtung in the Northwest Territories. A medical clinic is also planned for Schefferville, P.Q.

possibilities

To operate a uranium mine in the Beaver-
age area of northern Saskatchewan and to
engage in such exploration activity as the
company may see fit.

Long-term Plans

To continue the above with regard to
labile uranium markets.

Review of 1972 Operations

According to the operating policy
adopted in 1969, 70 percent of the possible
production of uranium yield was maintained
in 1972. The number of employees at year-
end was 372, of whom 267 resided in
Uranium City.

Plans for 1973

Plans at this writing call for continuing
operations at a reduced level.

GOVERNMENT OF THE NORTHWEST TERRITORIES

Responsibilities

To exercise government jurisdiction within the Northwest Territories, exclusive of control over natural resources (except game which is a Territorial resource).

Long-term Plans

To develop the Northwest Territories through legislation and administration suited to the special social and economic needs of the Northwest Territories, and to involve all northern residents in governmental, economic and social development.

Review of 1972 Operations

Of major significance during 1972 was Prime Minister Trudeau's dramatic announcement that a road would be built in the Mackenzie corridor to the Arctic; combined with the ever-increasing likelihood that a gas pipeline will be constructed. The Government of the Northwest Territories has been concerned with determining how these projects will affect the lives of northern people. All its efforts have been to achieve the greatest economic benefit with the least possible social disruption.

Two important new groups within the Department of Local Government have been established: an employment division, and a Mackenzie pipeline and highway project group. These groups are working together to ensure that the building of the road and the pipeline afford northern people every opportunity for employment, and that everything possible is done to allow people in the communities to gain economic advantages.

"Hire North", a Territorial government plan to employ northerners, is proving extremely successful. Over one hundred native workers have been employed clearing the way for the Mackenzie Highway; working in the land they know best.

To cope with social factors, the Territorial government made special efforts in the areas of adult education, recreation and alcohol problems. An independent study of the social effect of both the pipeline and the Mackenzie Highway was commissioned.

To give young people an appreciation of their cultural heritage, a major effort was made to include Indian and Eskimo cultural material in the school curriculum. An excellent example of this was at Igloodik, where students, parents, and teachers together lived off the land for the last two weeks of the school year.

There has been orderly growth at the level of local government as well, with four new hamlets being created in 1972.

Council Operations

Two sessions of council were convened during 1972.

The budget introduced at the 46th session, amounting to \$108 million, was the largest in the history of the Northwest Territories.

The Council Ordinance was amended to provide for the payment of members' indemnities in monthly instalments, and to increase the daily living allowance to a member attending sessions not within commuting distance of his normal place of residence. The ordinance also authorized the payment of a daily living allowance to a member attending a session within commuting distance of his place of residence.

An ordinance respecting snowmobiles was enacted by council to empower municipalities to regulate insurance requirements, licensing, registration and operation of snowmobiles within a municipality. A renewal of the agreement under which the Royal Canadian Mounted Police provided police services in the Northwest Territories was authorized

by council's enactment of the Royal Canadian Mounted Police Agreement Ordinance.

The 47th Session of Council was convened in Yellowknife on 19 June 1972.

An Ordinance To Amend The Medical Profession Ordinance was enacted by council to make eligible for registration and licensure in the Northwest Territories those doctors who do not hold a licence of the Medical Council of Canada but are registered in a province. By enactment of the Dental Mechanics Ordinance, council gave permission to persons qualified as dental mechanics to make or repair upper or lower dentures.

In matters of judicial legislation, council enacted ordinances amending the Maintenance Orders (Facilities for Enforcement) Ordinance, the Fatal Accidents Ordinance and the Child Welfare Ordinance, as well as an ordinance revising the Creditors Relief Ordinance.

To provide a framework for the orderly achievement of municipal status in accordance with local autonomy, council enacted an amendment to the Municipal Ordinance. Council also amended the Taxation Ordinance to ensure fair treatment of all areas and to incorporate into that ordinance legislation now contained in the Municipal Ordinance.

The report of the Northwest Territories Council task force on housing was tabled at this session. In the course of discussions, council adopted a series of motions designed to implement the task force recommendations.

Council adjourned in Yellowknife on 30 June and reconvened in Frobisher Bay on 1 October to complete unfinished business. October undoubtedly the single most important piece of legislation passed by council was the Northwest Territories Housing Corporation Ordinance. This ordinance provided the necessary legal structure to enforce the housing task force recommendations.

During the 47th session, as a step toward giving the maximum development of government within the Northwest Territories, the Council authorized the establishment of a committee on provincial-type responsibilities. David Searle is Chairman and T.H. Searles, Air Marshal Hugh Campbell, Dr. Hamelin and Bryan Pearson are members.

PUBLIC SERVICE

The government of the Northwest Territories has four program departments — education, industry and development, local government, and social development — and four service departments — public services, administration, public works and information. There is also a separate executive secretariat and a special unit for the clerk of the Council. The headquarters administration is in Yellowknife and there are regional offices in Fort Smith, Inuvik, Frobisher Bay and Churchill for the Keewatin. Plans are to open out the regional office in Churchill and to establish an area service office at Rankin Inlet.

DEPARTMENT OF LOCAL GOVERNMENT

Responsibilities

To help and encourage the development of local government; to administer the municipal and hamlet ordinances, housing programs, town planning and lands, recreation, emergency planning, public library services, pipeline and highway planning, and to coordinate employment for northern residents.

Review of 1972 Operations

Development Division

On 1 April 1972, four new hamlets were added in the Northwest Territories: Pangnirtung, Coral Harbour, Pelly Bay and Fort Reliance. Assistance to these new hamlets comprised a major part of the work of the development division. A new settlement council was also established at Sachs Harbour. Water and sanitation services, emergency services, sidewalks, streetlights, freezers, houses and laundries were provided to a number of settlements.

Municipal Division

There was considerably more growth in northern municipalities during 1972. Commercial and industrial development has

exceeded expectations, and the demand for accommodation has made necessary fully serviced residential sub-divisions in all major communities. To finance such projects, the municipal division has made available a series of debenture loans to the municipalities, which are repayable from the sale of the developed properties.

The assessment program is growing to keep pace with all phases of building expansion. The program is designed to ensure that there is equitable property assessment throughout the Northwest Territories.

An amendment to the Municipal Ordinance containing 65 clauses was submitted to the Council of the Northwest Territories and received approval at the June 1972 session. Many of the amendments were developed in co-operation with the NWT Association of Municipalities. The revised ordinance provides for substantially greater powers to those municipalities which have a firm tax base.

Housing Division

The housing division is responsible for all government-sponsored housing programs in the Northwest Territories, except employee housing, National Housing Act homes, homeownership loans and entrepreneur developments.

On behalf of the federal Department of Indian Affairs and Northern Development, the housing division administers the Northern Rental Housing Program which was conceived in 1965 to provide adequate shelter for Eskimos and treaty Indians. The total inventory of this program, including the 110 new three-bedroom single-family dwellings constructed during 1972, is now more than 2300 units.

The Territorial Rental Housing Program functions in the same way as the Federal Northern Program, except that low-rental housing is provided to persons other than treaty Indians or Eskimos, so as to place all ethnic groups on an equal footing. During 1972, 45 units were constructed bringing the total to nearly 300 dwellings. Capital value of this program is now \$3,000,000.

Significant in both the northern and territorial rental programs is the development of local tenant associations which are assuming greater responsibility for their own affairs. During 1972 more than \$1,250,000 was made available to housing associations by way of accountable grants. These grant funds are used to pay for fuel, power and housing maintenance, labour and materials.

Town Planning and Lands Division

Anticipating the possible effects of a highway and pipeline on settlements in the Mackenzie valley, planners began in 1972 to prepare for the development demands. In places such as Norman Wells and Fort Simpson this consisted of enlarged planning and utility studies. Work was also begun to ensure that the remaining communities along the corridor would be prepared for the changes.

Now general development plans are being finalized for Frobisher Bay, Cape Dorset, Rankin Inlet and Baker Lake. Revisions and updating of existing plans have been completed for Tuktoyaktuk and Pine Point.

A lands manual which is a comprehensive guide to policy and procedure has been prepared for field agents and all others engaged in public lands business.

Recreation Division

The main activity was the Arctic Winter Games held in Whitehorse. There was a marked increase in the number of competitors and teams entered in the trials to select representatives for the Northwest Territories. Due to the large number competing, the costs were high and the Government of the Northwest Territories had to make a grant of \$100,000.

In May the Northwest Territories Youth Council assembled for the first time in Yellowknife. The Council will act as an advisory body to the Inter-departmental Committee on Youth. They were most helpful in their initial meeting.

In both national and international competition, individuals and teams were entered from the Northwest Territories. Sharon and Shirley Firth represented Canada in cross-country skiing at the Olympics in Japan. In July the very successful Northern Games were held in Inuvik. For the first time competitors attended from the Baffin Region, with representatives from Cape Dorset, Lake Harbour, Pangnirtung and Frobisher Bay.

A heavy demand has been made on the Community Centres Grant, with new community centres being constructed at Wrigley, Lac La Martre, Rae, and improvements or extensions made at various other locations. The Community Centres Grant has been amended to provide the communities with greater assistance in the development of facilities and effective 1 April 1973, they will only be required to contribute 25 per cent of the total cost of construction.

Emergency measures

An emergency measures handbook has been published and is being translated into Eskimo syllabics for use in the Eastern Arctic. The handbook is designed to give the smaller settlements an outline of emergency measures and enable them to set up an emergency plan of their own.

In June the second Major Air Crash Conference was held in Yellowknife, attended by representatives of all agencies and departments which have an interest in major aircraft crashes. One of the results of the conference was the publication by the Emergency Measures Division of an air crash resource data book. This publication describes and gives the location of equipment and other resources throughout the North which could be useful after a crash has occurred.

The Spring floods in 1972 were worse than for several years past. Direct damage at Aklavik, Fort Simpson, and Hay River amounted to nearly \$80,000. The flood prevention work at Hay River was considered to have saved many times its own cost in avoiding damage to that community. There was less destruction from forest fires than in 1971. This is due in part to the smaller acreage burnt and also to the strengthened forest service fire suppression forces. In 1972 no community was more than momentarily threatened by the onset of fire.

1972 saw the formation of the Territorial Emergency Planning Committee on Oil Spills under the chairmanship of the deputy commissioner. This committee has undertaken to develop and co-ordinate the entire territorial responsibility for both prevention and clean-up work. As a result a reporting system has been organized and there has been much worthwhile co-operation between industry and government.

Public Library Services

In 1972 a highlight in public library services was the increased use of films, slides and video-tape recording equipment. Annual statistics for the year ending 31 March 1972 show an increase in circulation from 72,860 items in 1970-71 to 96,194 items in 1971-72. This is an increase of just over 24 per cent in circulation from the 19 service points throughout the Northwest Territories.

Employment Division

The goal of the employment division is to increase the employment of residents of the Northwest Territories, with emphasis being placed on disadvantaged groups.

A special study on employment in the delta communities commissioned late in 1971 was presented to the government by Gemini North in March. The report recommended establishing labour pools within northern communities as an effective way of enabling northerners to fill jobs at various projects in the North. A major feature of the recommendation was that complete responsibility and control for the labour pool would be vested in the local settlement council. An office together with required local staff would be established, and arrangements would be made to refer individual workers as well as to contract for the larger labour needs of both private industry and government. Pilot projects are to be established in Fort McPherson and Aklavik.

Pipeline and highway project

As part of the overall program of studies on the pipeline and highway, the Territorial government is committed to preparing a detailed plan of operations for handling those functions which affect northern people. Under the auspices of the Department of Local Government a special project group has been formed to carry out those responsibilities undertaken by the Territorial government. The project group consists of a project manager, headquarters staff and field staff. The group is responsible for the planning, liaison, administration and co-ordination of all Territorial government plans and programs related to the pipeline and highway.

Activities for the highway involve planning and organization, in consultation with the communities, to ensure that northern residents obtain full benefit from employment opportunities, that northern businesses are used to the greatest possible extent, and that the people of the communities reap the maximum economic benefits. In addition, work is being done to minimize the undesirable social effects on the communities.

Steps are being taken to ensure that the highway route and construction work do not interfere unduly with the environment. To this end, the Territorial government is helping to choose the route and plan the highway.

DEPARTMENT OF EDUCATION

Responsibilities

Curriculum, school services, adult education, vocational programs.

Review of 1972 Operations

A most important achievement of the Department of Education was the publication in June 1972 of the 213-page *Survey of Education*. The survey examines the evolution of the present education system in the Northwest Territories. Opinions were obtained from the staff on the type of education offered and objectives for education were developed which will reflect the wishes of the northern population served by the Territorial Department of Education. The more than 200 recommendations of *Survey of Education* point the way in many areas for change and improvement based upon intimate knowledge and competent professional judgment.

Enrolment

In September 1972 a total of 11,772 pupils were attending schools in the Northwest Territories; an increase of 5.3 per cent from 10,334 in 1971. The average increase over the past five years has been 8.6 per cent. More than 50 per cent of the increase can be attributed to a higher retention rate of students in our system.

Adult education

There are 49 active adult education programs which together provide opportunities for the teaching of literacy, home management, living in a changing environment, occupational training to participate in a wage economy. Other courses assist those who wish to live off the land; such as trapping, mineral identification, and guiding. There are also programs to train the handicapped; an apprenticeship program; assistance for higher education; and this year a program for training dental therapists has been added.

The Mackenzie valley pipeline and highway projects will bring great social change to the settlements in their path, and continuing and special education is needed to help people prepare for and cope with this change. Workshops for adult educators in these settlements and for the supervisors of the companies working with native people were held in the Fall of 1972.

Social education and home management is becoming increasingly popular with home makers. A total of 952 people took advantage of the many adult education programs within the Northwest Territories.

ational programs

Vocational education programs, including apprenticeship, are designed to train people for either wage employment or self-employment in specific occupations. The adult vocational training centre at Fort Smith now offers full-time courses in 13 major skills. Emphasis on skill areas has shifted to reflect the coming construction boom in the building of a pipeline and highway. In preparation for this construction the Heavy Equipment Operator Training Program is building seven miles of road at Hay River this year. During the period of training, 28 men were on the course.

Plans for increased training related to the highway and pipeline have been worked out between education and industry and will produce more training by early 1973. In addition, 286 people from the Territories benefited from vocational programs in nine provinces of Canada, and received training which had not yet available in the Territories.

A period of apprenticeship continues to be most effective for developing people with trade. To ensure that the apprentice is receiving work experience in all available trades, manual skills are learned on-the-job under close supervision. In addition, each indentured apprentice, during each year of apprenticeship receives six to eight weeks full-time, in-school trade theory.

t-secondary education

A total of 156 students received financial assistance under the Northwest Territories Students Grant Program. This program provides financial assistance to all students whose parents are residents of the Northwest Territories and who have gained admission to a recognized university. Financial assistance takes the form of paid tuition, textbooks, transportation costs, and costs of food and lodging. Another 12 independent students, with established northern residency but not eligible for a grant, received bursaries of up to \$1,500 each to take undergraduate or post-graduate training.

riculum

The most significant and encouraging aspect of the work of the curriculum division is the involvement of people from a variety of cultural backgrounds and walks of life in the preparation of learning materials for use in their schools. From these sources, plans were made to publish a thirteen-part Inuit history series based on the recollections of Fort Resolution residents. The Inuit Islanders provided information

on traditional ways of life which will form the basis for an illustrated portfolio. From Keewatin a collection of legends, illustrated by the people of Eskimo Point, was written in both English and Eskimo syllabics. Residents of the Wrigley and Fort Simpson areas collected information on various aspects of life among the Slavey people.

As an integral part of a cultural inclusion program, the students and parents of Igloodik planned and carried out a "living on the land" project during the final two weeks of the school year. A majority of children, parents and teachers, lived on the land and practised many of the traditional Eskimo customs.

To complement the preparation of teaching materials, an elementary curriculum handbook was introduced and subsequently revised. Suggestions for improving the curriculum were solicited from teachers, parents and interested persons throughout the Northwest Territories as well as from universities, departments of education, and teachers' organizations throughout Canada and abroad. Indian and Eskimo organizations were also contacted and asked to submit their views. Based on these exchanges of information, the program for kindergarten through grade six was extensively rewritten and prepared for publication before the 1972 school year.

The next stage in developing the school program calls for research and writing of a junior high school curriculum which will extend through to grade nine the present general approach of the elementary years.

School construction

Students in Hay River started classes in September in the newly constructed Diamond Jenness High School. Of radical design, the school's several innovative features reflect modern approaches to the organization of teaching areas and to modern teaching methods. It is anticipated that the community will use the school as a focal point for social activities.

The Deninoo School in Fort Resolution is basically an open-area design which lends itself to the most flexible possible use of teaching space.

Similarly, educational and community needs have been met in Rankin Inlet which opened a new 14-classroom elementary junior high school. This school was constructed to allow consolidation of school facilities at one location and to provide for increased pupil enrolment resulting from community growth and the extension of a curriculum through to grade nine. Major

school additions were completed in Inuvik where ten classrooms were added to the Samuel Hearne High School and in Igloodik where the addition comprised four classrooms, library, technology centre, and gymnasium.

The new elementary school in Frobisher Bay, begun in 1971, is scheduled for completion and occupancy in September 1973.

Teacher training and recruitment

Due to the continued increase in school enrolment the teaching staff for 1972-73 in schools of the Northwest Territories has increased by 21 teachers over 1971-72. In September 1972 there were 632 teachers employed in elementary and secondary education in the Northwest Territories.

Among newly appointed teachers in the North in September 1972, were northern teachers trained under the Northwest Territories Teacher Education Program. Between 1969 and 1972 students who participated in the program alternated between teaching in northern elementary school classrooms, taking further training in the Northwest Territories, or taking relevant university credit courses at the University of Alberta, Edmonton. Some trainees went on to other jobs or to full-time university degree study. In September 1972 four graduates of this first teacher education program began full-time teaching in the elementary schools of northern settlements. There were new entrants to the program in 1970, 1971, and 1972 bringing to 60 northerners the number of people involved in various stages of teacher education.

The Classroom Assistants program continues to employ larger numbers of assistants in the classroom, and their teaching role is becoming increasingly important. In September 1972 a total of 76 classroom assistants was placed in term positions with all the benefits of the NWT Public Service. At the same time the assistants were granted a substantial wage increase.

DEPARTMENT OF SOCIAL DEVELOPMENT

Responsibilities

Social assistance, blindness and disability allowances, child welfare, medical-social services and rehabilitation, corrections, alcohol education, and the health care plan.

Review of 1972 Operations

Social assistance

Social Assistance expenditures for the fiscal year 1971-72 totalled \$1,268,136.

There were no major changes in the administration of social assistance or categorical allowance programs from the previous year. The increased cost of social assistance in 1972 is primarily the result of increased food allowances introduced during 1971. Major emphasis during the year was on preparations to enable the Government of the Northwest Territories to sign an agreement with the federal government under the Canada Assistance Plan. By the end of the year this work was sufficiently completed for the Commissioner to make formal application for entry into the plan.

Child welfare

As of 31 March 1972, there were 270 children in permanent care of the superintendent of child welfare. There were also 97 children in temporary care during the 1971-72 fiscal year and 59 children were adopted.

The commissioner's order of 19 March 1972 made possible the integration of juvenile delinquent and child welfare services. The superintendent of child welfare is now responsible for all children committed to care by the courts.

Medical, social services and rehabilitation

At present an average of 34 persons require special care and are accommodated in hospitals or other institutions in or outside the Territories. In many instances, contracts for service with provincial institutions are necessary, particularly for care of the mentally retarded.

Alcohol education

As a result of unifying the department's field services, responsibility for providing alcohol education services was assigned to the four regional superintendents of social development. This change necessitated more effective training in the treatment of alcoholism for field staff of the department.

During 1972 alcohol education staff at headquarters conducted an information-education program in advance of local option plebiscites in communities requesting liquor outlets. The activity is carried out as a joint project with the liquor control board.

A highlight of the year was the establishment of a grants program, totalling \$100,000 apportioned on a population basis

to the regions. Funds are available to any community group which produces an acceptable proposal to assist in alleviating drinking problems, bringing about further understanding of the problems, or providing a community with an alcohol-free social facility as an alternative to the drinking pastime.

Corrections services

During 1972 the Corrections Service continued to operate the Yellowknife Correctional Institution and the Correctional Camp, facilities designed for adults sentenced to periods of detention under two years.

During the year the institution was the subject of a study conducted by a consulting architect with a view to increasing and diversifying its capacities and subsequent reconstruction. The correctional camp has remained work-oriented in its philosophy. Inmates have carried out such valuable tasks as preparing tourist camp and picnic grounds by clearing, erecting site markers, making hiking trails, cutting timber for firewood reserves, and constructing coffins for the indigent dead.

On 1 April 1972, the Juvenile Training Centre in Fort Smith ceased to be a section of the Corrections Service and was transferred to the Child Care Services of the department. Similarly, the responsibility for providing probation and parole supervision and the after-care of released inmates of correctional institutions was delegated to regional superintendents of social development and their field staff.

Health care plan

The Health Care staff are responsible for administering the Territorial Hospital Insurance Services Ordinance and the Medical Care Ordinance. To consolidate administration of the Health Care Plan within the department, the director was appointed chairman of the Territorial Hospital Insurance Services Board.

Guidance and executive authority for administering the Territorial Hospital Insurance Services Ordinance is provided by the Territorial Hospital Insurance Services Board. Medical advice for both ordinances is provided by a medical adviser who is employed by the administration to adjudicate disputes over length of stay in hospitals and the propriety of charges for physician's services. The plan's administrative offices moved from temporary location in Edmonton to Yellowknife 1 July 1972. The board

increased the number of budget review hospitals from three to four, accepting Fara Hospital Rae, as of 1 January 1972.

In the first twelve months of operation payments for Medicare amounted to \$695,875.

DEPARTMENT OF INDUSTRY AND DEVELOPMENT

Responsibilities

Promoting and assisting industrial development, tourism, research and planning and game management.

Review of 1972 Operations

Research and planning

For much of the year planning for a Mackenzie valley pipeline and for the newly announced Mackenzie highway was a major activity of the research and planning section. Close liaison was maintained with federal government agencies with continuing input to federal planning for both the pipeline and highway. Direct federal financial support was being obtained to assist in our planning, to make possible two game management studies related to the pipeline.

A consultant, who was made available to the people of Rae, completed a study of feasibility of a commercial complex or shopping centre at Edzo. The results were presented to the people for their decision whether to proceed.

The second annual edition of *Community Data* was published, giving up-to-date information of an economic nature on all communities within the Northwest Territories.

Industrial development division

The Government of the Northwest Territories is now responsible for administering its portion of the Eskimo Loan Fund which makes available \$600,000 for loans to Eskimos who wish to participate in business enterprises. During the initial year, when the Government of the Northwest Territories was responsible for the Eskimo Loan Fund, loans in excess of \$160,000 were provided bringing the fund's total loans to more than \$575,000.

Continued interest was exhibited in the Small Business Loan Fund of the Northwest Territories, and an additional \$400,000 was lent during the year, bringing the total to \$900,000. Financing from this source was provided to establish machine shops and cleaning shops, to purchase and operate

ool buses, to provide warehouses, and to a fishing lodge.

As a result of legislation passed by the Session of Council, 1971, the Canadian Co-operative Federation Limited was established as a co-ordinating body for all co-operatives in the Northwest Territories. To help the federation become established, to provide for its operation until such time as revenue-producing services are developed, the Government of the Northwest Territories provided a grant of \$75,000 for the fiscal year 1972-73. Subject to the satisfactory development of services, financial assistance of diminishing amounts will be made to the federation over the next several years with a view to complete financial independence not later than the 1977-78 fiscal year. At the end of 1972 there were 40 co-operatives and two credit unions established in the Northwest Territories. With the addition of a mill at Wrigley, the number of sawmills producing lumber in the Territories increased to eight during the past year.

A number of jobs have been created at Pelly Bay with the start up of a second primary manufacturing fibreglass water tanks. Water tanks manufactured at Fort Resolution Bay and Fort Providence are used for fish storage provided under the Northern House program.

Sales by Canadian Arctic Producers Limited are continuing to grow and during 1972 will reach an estimated \$2,000,000; a 50 per cent increase over the northern producers of approximately \$1,300,000.

Two Eskimo carving projects at Iglood Island and Spence Bay have been developed rapidly, and it is expected that they will soon be turned over to the people of those settlements.

Advantage is being taken of the increased activity in the gas and oil industry. A canvas tent project was established at Fort Resolution and prototypes of several items have been produced and are being marketed. These canvas products are expected to be sold to the petroleum industry as covers, shelters, tarpaulins and oil rig covers.

The newly completed \$1.5 million Freshwater Fish Marketing Corporation plant at Tuktoyaktuk is expected to make a major contribution to the industry. This plant contains modern processing equipment for rapid utilization of the resource and enable the corporation to purchase and process certain species of fish which have not been harvested so far. In peak operation it is expected that 70 new jobs will be

created for local people in the fishing and plant operations.

Fishing continued on Great Slave Lake (2,988,000 lbs.), Lac La Martre (181,700 lbs.), Cambridge Bay (140,000 lbs.), Pelly Bay (25,000 lbs.) and in the Keewatin Region (56,500 lbs.). Several small fisheries in the Baffin Region supplied approximately 25,000 lbs. for inter-settlement trade.

Tourism division

Tourism continued to be one of the major industries in the Northwest Territories during the year, with its gross revenues being exceeded only by those generated by the exploitation of non-renewable resources. The new grant program, announced in 1971, was initiated in 1972 to assist remote indigenous communities to realize increased economic benefit from the tourism industry. When a community has no accommodation the program provides financial assistance for the construction of new accommodation or renovation to existing buildings owned by the community.

With the co-operation of lodge owners and outfitters, on-the-job guide-training was provided at four fishing lodges and one big-game hunting camp. Initial reaction to the program was favourable; additional guide-training on-the-job is planned for the future. Management training was provided to the operators of Trout Lake Indian Lodge.

In conjunction with the Canadian Government Travel Bureau's "In Canada" travel promotion, a major project to encourage Canadians to see their own country, the tourism division escorted 12 travel agents and tour operators from across Canada through the Western Arctic, including Hay River, Yellowknife, Inuvik, Tuktoyaktuk, and surrounding areas. The aim was to familiarize the agents with the potential for tourism in the Northwest Territories. The visitors were enthusiastic in their response to the North, and, as a result of the visit, new package tours are being arranged for 1973.

The second edition of the *Explorers' Guide* and the revised Official Travel Map were published early in the year, before the tourist season. Approximately 20,000 enquiries from tourists were processed from September 1971 to August 1972.

Game management division

The value of fur production in the Northwest Territories was \$1,417,600 in 1971-72, up from \$1,197,200 the previous season. The number of pelts did not increase significantly, but the market was better, and local

fur buyers were able to pay higher prices.

The production of white fox pelts was up by 6,000 to 33,000; however, the average price for this species declined from \$12.30 to \$11.50. An average price of \$1.67 was paid for 91,000 muskrats. Beaver production dropped by 2,000 pelts to 5,000. This was offset by the 50 per cent price increase, with the average being \$15.50. The numbers of mink and lynx taken remained constant, but a price increase as great as 75 per cent was noted. Polar bear taken by trappers amounted to 417, and the average value of hides jumped from \$214 to \$340. Seal production was down slightly at 32,000, but the value continues to strengthen, being up \$0.75 to \$10.00.

Resource harvesting in remote locations is being encouraged by constructing low-cost cabins. This project is proving of great interest to the hunters and trappers in the Keewatin and Baffin regions where it is desirable to combine hunting and trapping. Transceiver radios transmit emergency communications between the game management officer and the established camp.

The Game Management Division expanded its Game Management Officer Training Program in 1972 by hiring seven northerners. These trainees were given basic instruction by headquarters staff in Yellowknife for a period of six weeks. Subsequently, the trainees were sent to various settlements in the Northwest Territories for further training under the supervision of a game officer.

The quota and tag system has continued to be successful in controlling the harvest of polar bears by indigenous people. Four hundred and seventeen bears were taken from a quota of 422. The polar bear sport hunting program was expanded slightly to include the settlements of Holman Island and Coral Harbour, each of which allowed four of their quota to be used in the program. A total of 16 sport hunters participated. The program resulted in a gross revenue to the four settlements of \$34,000.

The program of organized settlement caribou hunts continued this year to give assistance to people dependent upon caribou as a food source. A total of 203,400 pounds of meat valued at over \$120,000 was harvested under the program.

DEPARTMENT OF PUBLIC SERVICES

Responsibilities

Legal services, administration of ordinances, legislative counsel, administration of

magistrates and territorial courts, administration and enforcement of safety regulations, labour standards, administration of the liquor control system.

Review of 1972 Operations

Legal counsel

The Legal Counsel Division provides legal services to the Territorial executive and the several departments of the Territorial government. These services include preparing and studying contracts and other documents, providing legal advice, enforcing ordinances and regulations, engaging in civil litigation, and issuing lottery and bingo licences.

Administration and registries

This division is responsible for providing administrative support to the entire department including requisitioning supplies and co-ordinating all matters concerning department personnel. The division prepares the annual budget and financial forecast and administers all financial aspects of the department.

The Registries Section administers the Land Titles Registry, the Companies Registry, and the Securities Registry, including the licensing of brokers, agents and salesmen, the Co-operatives and Societies Registry and the Documents Registry for the registration of commercial documents. The Securities Registry is gradually becoming known, as before 25 June 1971 there were no restrictions on the sale or advertising of securities in the Northwest Territories. Several salesmen and companies selling securities without being registered were given notice of the provisions of the ordinance and have either applied for licensing or ceased selling.

The number of all vehicle and driver registrations showed a steady increase, except for tractors and miscellaneous vehicles, which decreased because of changes in the legislation. Under the new Snowmobile Ordinance the municipalities became responsible for the licensing and control of snowmobiles.

Legislative counsel

The legal advisor to the Council of the Northwest Territories provides legal advice and services related to preparing, publishing and distributing all Territorial legislation. The legal advisor also controls the registration of all orders and regulations issued by the commissioner.

Thirty-eight ordinances were enacted in 1972.

Legal aid

The goal of the legal aid program is to provide to all residents equal justice under the law. The objective is to provide legal aid on both criminal and civil matters to every resident of the Northwest Territories who cannot afford to pay for legal services without depriving himself and his dependants of reasonable necessities and without sacrificing modest capital assets. The total amount spent on legal aid from 17 August 1971 to 31 March 1972 was \$43,311.48.

Court services

The Territorial Court of the Northwest Territories was renamed the Supreme Court of the Northwest Territories effective 1 October 1972. A steadily increasing volume of cases heard by the Territorial court and the magistrates courts necessitated a review of procedures and documentation. The large number of documents filed with the court and the writs, distraints and processes requiring action by the sheriff were a good indication of the increase compared with previous years, in commercial activity in the Northwest Territories.

Administration and enforcement of safety regulations

The Safety Division enforces and administers all fire and safety ordinances, including inspections and investigations. Responsibility includes enforcing general safety practices.

There were slightly more than 1800 fire inspections of public buildings and low-cost northern houses. There are 42 organized fire departments and 460 volunteer firemen who spent over 12,000 man hours training to fight and prevent fires. Two new fire halls were built and one new fire truck purchased. The halls also provide council chambers and hamlet offices. One hundred and sixty-three fires were recorded in 1971.

Labour standards and workmen's compensation

The Labour Standards and Workmen's Compensation Division provides the administrative enforcement, education and public services necessary to ensure that the objectives of the Labour Standards Ordinance, Fair Practices Ordinance, Wages Recovery Ordinance, and other legislation of an employer-employee nature are achieved.

The chief of the division supplied secretariat services for both the Labour Board of Inquiry and the Workmen's Compensation Board of Enquiry, as appointed by the com-

missioner to conduct public hearings throughout the Territories, to discuss and review existing legislation and to prepare reports.

The workmen's compensation office transferred from Edmonton and opened in Yellowknife on 6 June 1972. As anticipated this move has provided a better service for employers and employees. The office processed 1,689 injury claims, and ensured that the 956 registered employers met their insurance, exemption and assessment provisions of the Workmen's Compensation Ordinance.

Liquor control system

Nine stores sold spirits, wine and beer; two agencies sold only beer. Sales revenue increased a further 16 per cent in the first year ending 31 March 1972, and it is estimated that in 1972 sales will exceed \$7,250,000. This increase in volume taxed the warehouse facilities to the limit, and the end of 1972 it is expected that extensions to the Inuvik and Frobisher stores will be finished.

The liquor control board held 11 meetings in the first eight months of 1972. One public meeting was held in Fort McPherson. Two local option plebiscites were held, one in Norman Wells and one in Fort McPherson. These were administered for the board by the Department of Local Government.

In the first eight months two licences were temporarily suspended for repeated violations of the ordinance and regulation.

DEPARTMENT OF ADMINISTRATION

Responsibilities

Administration of financial operations, materiel management, data processing, other services, personnel administration.

Review of 1972 Operations

Financial operations

For the Government of the Northwest Territories during 1971-72 revenue was \$77,245,630 and expenditure \$90,957,4

Materiel management

The 1972 shipping season was the first annual supply operation of the settlement in which the Territorial Government was able to play a significant role. Major changes were made in the financial arrangements with ship owners which resulted in a substantial saving in freight rates to the government. The use of local northerners instead

thern stevedores was ensured by entering contracts with co-operatives and other organizations for the movement of light from the ships. It is proposed to use bulk storage facilities to reduce the cost of gasoline in the elements. The division is also planning to provide more assistance to the private sector in transportation and purchasing.

Data processing

The Data Processing Division was strengthened by the acquisition of resident programmer-analysts, as well as the expansion of responsibilities to include a management-analyst group transferred from the executive secretariat. These changes have permitted the formation of a complete systems development capability to service all government departments. A major review of the future data processing needs of the government was completed in 1972, which culminated in the launching of a new system for 1973. Included in the plans are terminal operations at various field offices, some of which will be utilizing the new satellite for data transmission.

Office services

The Office Services Section is responsible for providing the necessary communications and central registry facilities for the Territorial government. In 1972 the mailing unit handled approximately eighty tons or 1.2 million pieces of mail. The remaining communications services handled over 70,000 telephone calls and telex messages.

Personnel administration

The Personnel Administration Division is composed of four main units: recruitment and placement service; employee accommodation; pay administration; and profit and subsidy administration. The competition procedures were changed early in 1972, and since then the time required to fill vacant or new positions has been reduced from an average of eight weeks to an average of just over four weeks. Approximately 275 competitions were conducted during the year for which there were 200 applications. Employee accommodation continued to be a major problem during 1972, although a small number of employees moved into their own quarters during the year. Forty new houses were constructed in Yellowknife during 1972, and approximately 100 additional units were leased in Yellowknife, Hay River and Inuvik.

DEPARTMENT OF PUBLIC WORKS

Responsibilities

All aspects of public works including design, construction and maintenance of roads, buildings and municipal-type services.

Review of 1972 Operations

Project management division

This new division, formed by amalgamating the former design and construction divisions, permits continuity of management from the point where other government departments specify their needs, through initial planning, design, tendering and construction, to completion of the projects.

A significant contribution to the health of northern residents has been the construction of the Adult Vocational Training Centre Dental School in Fort Smith. The correctional institute in Yellowknife underwent major additions and alterations. The housing groups were responsible for planning, shipping and construction of 151 low-rental houses, 40 staff houses, 11 classrooms built using pre-fabricated panels, settlement offices and one combination fire-hall and settlement office.

Emphasis was placed on employing local labour in the preparation of contract documents, building and works design and planning, and project site supervision.

Highways division

In 1972 roads reached into the wilderness of the Territories to link centres, provide access to the wealth of the North and permit improved communications. Due to the extended winter in the North and the consequent freezing of the ground, many miles of winter roads, ice bridges and tote trails were established to permit further exploration and to make furnishing equipment and supplies accessible to the entrepreneurs.

The highway maintenance establishment is also responsible for 840 miles of trunk highways, 80 miles of secondary roads, 420 miles of winter roads and ice bridges, and 205 miles of access and service roads in tourist campsites and in Wood Buffalo National Park. The Mackenzie highway, which is the main link between the larger centres to the south of Great Slave Lake, and which also extends north to Yellowknife, is the principal road going south to the border of Alberta. These roads are maintained throughout the Year by five permanent highway crews. In 1972 a three-year contract was awarded by the government to maintain

the Mackenzie Highway System's latest extended route reaching Fort Simpson on the Mackenzie River.

Operations and maintenance division

Expenditure on operations and maintenance in 1972 was almost \$13,000,000. This is a slight decrease from the previous year's expenditure due to the establishment of more hamlets which have acquired their own responsibilities under the guidance of the Department of Local Government.

During 1972, when the commission has been ready to receive them, this division has continued to transfer government-owned power generating plants to the Northern Canada Power Commission. It is the policy of the government to have N.C.P.C. generate and supply power to the Northwest Territories.

Due to the late breakup of sea ice which prevented shipping to many areas on normal schedule, supply and construction in the Eastern Arctic were severely delayed in 1972. This delay shortened the work season and hampered maintenance.

DEPARTMENT OF INFORMATION

Responsibilities

To provide a centralized service in the English, Eskimo and Indian languages to interpret the government's aims and objectives to the public; to produce a variety of government publications; to operate the government's central printing unit.

Review of 1972 Operations

Public relations division

A valuable addition to the staff was an information officer-translator who began producing an Indian newsletter "Goinsiday." The newsletter, distributed to communities throughout the Mackenzie valley, is printed in English and recorded on cassette tapes in the Slavey, Chipewyan, Dogrib, Hare and Loucheaux languages, and circulated to community councils, chiefs and band councils.

"Tukisiviksats", the department's Eskimo newsletter is being well received in the settlements, with excellent reader response. The newsletter, which is printed in English and in Eskimo syllabics, is circulated to 5,000 people in the Arctic.

The department also appointed a Baffin Region information officer to work out of the regional director's office in Frobisher

Bay. This officer is responsible for developing communications in the Baffin Region by promoting community-based newspapers, excerpts from which can be transmitted by radio to exchange information with other communities.

In order to effectively communicate within the various language groups of the NWT, a decision was made to establish a knowledgeable and expert corps of Eskimo and Indian interpreter-translators. The interpreters will be located at Frobisher Bay, at Rankin Inlet for the Keewatin Region, at Fort Smith, at Inuvik and in Yellowknife. They will be responsible for both written and verbal translation.

To improve the techniques for communication in the Northwest Territories, the Department of Information has developed a social communications program which will establish small radio stations in the outlying communities of the Northwest Territories. The program is designed to provide financial assistance to the community or hamlet council wishing to purchase radio transmitting equipment.

The Department of Information also installed a photographic dark room for processing and printing black-and-white photographs. This installation has proved valuable in the production of two newsletters and other in-house publications, and has made it easier to meet the increasing demands of outside agencies for good quality photographs of the North.

Publications division

At the request of the Alcohol Education Division of the Department of Social Development, the department developed and designed four books on alcohol education. They will have a format resembling a professional comic book, and will be released in early 1973.

A major effort of the Publications Division is the Annual Report of the Commissioner of the Northwest Territories. The report is the only one of its kind sold in bookstores throughout Canada. It is a 124-page, full-colour, hard-covered book, produced in English and French.

In an attempt to improve its information program aimed at southern Canadians, the department launched a magazine entitled "Arctic in Colour". One hundred thousand copies were printed and distributed in southern and northern Canada by a national distributor.

Since the Department of Information took over responsibility for the central government printing unit, it has followed a policy of updating the printing equipment and operations of the print shop, while encouraging government departments to have more work printed privately. This decreases the back-log of work in the shop and at the same time supports northern printers.

EXECUTIVE SECRETARIAT

Responsibilities

Financial co-ordination and program analysis, secretariat services, program policy & planning, audit bureau, personnel policy and planning.

Review of 1972 Operations

The executive secretariat is responsible for providing administrative, advisory, planning and staff support to the executive of the Territorial government. A special unit within the secretariat handles secretarial functions for the executive committee and various boards, committees and commissions appointed by the commissioner.

Audit bureau

A senior management review carried out under executive direction in January 1972 led to the transfer in May of the Management Services Activity to the Department of Administration. Operational audits were performed on all financial and related activities. The goal of these audits is to provide the executive and management with objective appraisals, recommendations and comments. As a direct result of all audits, permission was obtained to translate into Eskimo syllabics and to distribute a paper entitled "How to read a financial statement".

Personnel policy and planning

In early spring of 1972 preparation was made for collective bargaining with the two bargaining units of the public service. In early May after a week of bargaining, negotiations were successfully concluded with the Public Service Association and a two-year contract was ratified. Within a short period, bargaining was also being conducted with the Northwest Territories Teacher's Association and agreement was reached, after seven days of negotiations, on a new two-year contract.

A formal review is being done to streamline the government's classification and salary administration plan. With increased

diversification of skills and continuing reorganization of responsibilities, a plan is being developed to facilitate faster response and easier maintenance.

Financial co-ordination and program analysis

The Financial co-ordination and Program Analysis Division co-ordinates, analyzes, prepares all financial forecasts and estimates. It also analyzes policy and program proposals and projected changes in organizations. The main highlight of 1972 was the development of the Planning Program Budgeting (PPB) System in the Government of the Northwest Territories. By grouping into programs, this system relates objectives to planned expenditures.

Program policy and planning division

This division has major responsibilities for co-ordination and liaison between the Territorial government and various committees of the federal government. Most work in this area concerns the main and various sub-committees of the Advisory Committee on Northern Development. There has been particular involvement with the transportation and the communications sub-committees.

The division has undertaken or has been involved in several planning and research projects concerning potential new programs and policies, such as; territorial interpreter translator corps; Keewatin organizations committee; management reporting system; cultural programs; new townsites at Resolute; projects for communications technology; satellite; aesthetic pollution; growth cen-

A paper was prepared recommending the Ministry of Transport to establish 13 low-cost Visual Omni-Range Distance Measuring Equipment (VOR-DME) navigational stations. After a critical review and some revision by the Ministry of Transport, the idea was accepted. The first test facility being constructed in Cambridge Bay and will be monitored for one year. If this is successful, 13 more stations will be constructed in the Northwest Territories in 1974.

CLERK OF THE COUNCIL

Responsibilities

To supply support services to the Council of the Northwest Territories, secretariat services to various council committees, and liaison with the chief electoral officer of Canada.

Review of 1972 Operations

Support was provided for two sessions of Council of the Northwest Territories held in 1972. Services provided included record-keeping, editing, printing and distributing the record-type debates of Council and the production and distributing of Bills and sessional material.

A tape recording system was tried out at the meeting of Council, held in June 1971. It was found acceptable and a permanent audio recording system was purchased and installed for initial use at the January 1972 session.

At the annual meeting at Regina, of the Association of Clerks-at-the-Table in Canada, the Clerk of the Council of the Northwest Territories was elected president of the organization for the ensuing year.

GOVERNMENT OF THE YUKON TERRITORY

ADMINISTRATION OF THE YUKON TERRITORY

Responsibilities

To administer the Yukon Territory in accordance with the Yukon Act and other federal laws applicable thereto, and the ordinances of the Yukon Territory.

Review of 1972 Operations

The Yukon Territorial Government completed negotiations with the federal government and officially assumed responsibility for maintenance of the Alaska Highway 1 April 1972.

Expropriation of land and buildings, soil surveys, clearing of land and the final architectural planning for the new capitol building were accomplished during the year.

Plans for 1973

The Territorial government will call tender on the first construction phase of the new capitol building early in 1973. Construction of the complex should begin during the summer.

COUNCIL OF THE YUKON TERRITORY

Responsibilities

To exercise powers comparable to those of a provincial legislature.

Review of 1972 Operations

An event of considerable historical significance was the presentation of the Mace on 6 March 1972 to the Speaker of the Yukon Legislative Council by His Excellency The Right Honourable Roland Mitchener.

The 1972 first session of council convened on 31 January and recessed 23

February 1972. During the recess Mr. Mitchener, and the Honourable Jean Chrétien, Minister of Indian Affairs and Northern Development, visited the Yukon and presided over the Arctic Winter Games. Council reconvened on 14 March 1972 and prorogued on 30 March 1972. During the session, thirty Bills were introduced, with one being withdrawn and the remaining twenty-nine passed.

The 1972 second session of council convened on 5 December 1972 and prorogued on 8 December 1972. The Session saw the introduction and passing of three Bills: An Ordinance to Amend the Coroners Ordinance, An Ordinance to Amend the Local Improvement District Ordinance, and An Ordinance to Repeal the Lands Ordinance. Some of the more important Bills passed during the First Session were: Municipal Ordinance, Taxation Ordinance, Mediation Board Ordinance, Local Improvement District Ordinance, and the budget for the 1972/73 fiscal year.

Plans for 1973

Several short special sessions of council are planned for the year, to deal with outstanding legislation.

ADMINISTRATIVE SUPPORT SERVICES

Clerk of Council

Responsibilities

To provide legislative and administrative support services to the Council of the Yukon Territory and the executive committee.

Review of 1972 Operations

Consolidation of the ordinances of the Yukon Territory was completed during

1972. Secretarial services were provided by the clerk of council to the executive committee, the assistant clerk of council to the subcommittees of the executive committee and by the research officer to the federal interdepartmental co-ordinating committee. The staff of the office of clerk of council recorded and transcribed council proceedings throughout the year. The clerk of council planned official tours for such visiting dignitaries as: Mr. C. Clemens, principal British trade commissioner; a delegation of Russian visitors headed by Noviko Ignatov, Chairman of State Committee on Construction; Mr. J. Nutt, Canadian consul general, San Francisco, California; Mr. O. Lang, minister of justice; a group of international geographers; a group of international geologists; Mr. J.H. Stutesman, American consul general, Vancouver; several French civil servants; and Mr. J. Ballard, deputy secretary Australian Department of Interior. Legislative support services include such duties as typing legislation and other documents for consideration by Council.

Statistical and planning adviser

Responsibilities

Primarily responsible for dissemination of accurate statistics relating to the Territory's economy.

Review of 1972 Operations

The statistical and planning adviser carried out a continuing program of research into various aspects of northern economic planning to assist in the development of government policies.

Plans for 1973

To continue the provision of statistical and research information to department and the Territorial government.

ADMINISTRATIVE AND LEGISLATIVE PORT SERVICES

Personnel adviser

Responsibilities

The central personnel office is responsible for recruiting and selecting civil servants, administering and interpreting the collective agreement; contract negotiations; job evaluation and pay administration; staff control and organizational analysis; employee appraisal, training and the administration of the benefit programs.

Long-term Plans

They include the development of an active staff control program, the development of a personnel policy manual and the utilization of the computer for statistical

Review of 1972 Operations

Appointments

A total of 1,689 appointments was provided of which 581 were permanent appointments to the Territorial government.

Classification and Pay Administration

Approximately 119 position transactions and 8 classification and pay plan amendments were processed during the calendar year. A number of class specifications were developed and printed for distribution throughout the government service.

Development and training

Approximately 100 employees received some form of financial assistance in updating their skills through attending courses jointly sponsored by the personnel office and the departments. The courses included basic advisory training, management by objective courses, effective management courses, as well as correspondence courses primarily in accounting and appraisal.

Collective Agreements

A two-year agreement was negotiated with the Yukon Teachers' Association, effective 1 September 1972 to 31 October 1974. Preparation commenced in the latter part of the year for the forthcoming negotiations with the Public Service Alliance of Canada covering employees of the Yukon Territorial Public Service Association. A number of grievances were processed and the department held hearings before a member of the Yukon Public Service Staff Relations Board on managerial and confidential employees. An adjudicator, appointed by

the Yukon Public Service Staff Relations Board, dealt with three adjudication cases within the course of the year.

The transfer of Alaska Highway maintenance personnel was completed on 1 April 1972, covering approximately 130 employees, and employees of the bargaining unit participated in the Disability Insurance Plan, effective 1 April 1972.

Plans for 1973

The government will be negotiating with the Public Service Alliance of Canada to renew the collective agreement which expires on 31 March 1973. The new collective agreement will cover approximately 720 bargaining unit employees.

During the year, the Central Personnel Office will again place emphasis on interpretation and administration of the new collective agreement and greater emphasis will be placed on staff establishment control and organizational analysis. The trend of offering or sponsoring a greater number of training courses within the Yukon for employees, supervisors and managers will continue. The central personnel office will review the Public Service Ordinance, and subsequent regulations during 1973, with a view to developing a personnel policy manual.

Emphasis will be placed on effectively communicating with departments and ensuring that personnel officers periodically visit regional offices outside the central headquarters area to clarify the interpretation and application of the collective agreement, answer enquiries, and generally review operations related to personnel management.

DEPARTMENT OF EDUCATION

Responsibilities

To provide elementary and secondary education for the students of the Yukon Territory according to the provisions of the Yukon Schools Ordinance.

Long-term Plans

Improvement and expansion of the present program and facilities, with particular emphasis on Indian education, special education and the development of locally-oriented curricula.

Review of 1972 Operations

Elementary and secondary schools

In September 1972 the school population was 4,815, an increase of 15 or 0.3 per cent

over the previous year. There were 50 fewer beginners enrolled in September 1972 as compared with September 1971. This number represents a decrease of 10 per cent in the Grade One enrolment. The 22 schools under the jurisdiction of the Department of Education are staffed by 258 teachers. The largest school, the F.H. Collins Secondary School, enrolls 1,028 students in Grades 8 through 12. Senior secondary grades are also enrolled at Mayo, Dawson City, Watson Lake and Faro. In accordance with the Yukon philosophy of providing secondary education as close to the homes of the students as possible, the instructional programs at Carcross, Carmacks, Teslin and Ross River were extended to include Grade 10. Boarding assistance continues to be offered to students who are compelled to live away from their family homes to obtain their education.

During 1972 a number of major construction projects were completed. The second phase of the Faro School, which includes four classrooms, an industrial education shop and a home economics laboratory, was completed. A major addition to the Jack Hulland School in Whitehorse was also completed. All facilities required for the junior secondary program were included in the building and it is anticipated that the school will provide for the educational needs of the expanding suburb of Port Creed for a number of years. An addition to the Selkirk Street Elementary School, which included eight classrooms and library, was also completed and the need for portable classrooms was eliminated. The construction of a new 20-room junior secondary school in the Riverdale area of Whitehorse was completed but the school will not be occupied until September 1973. Finally, a teacherage in downtown Whitehorse was renovated and refurbished to provide dormitory accommodation for a maximum of 19 male students.

The Department of Education continued its assistance programs to pre-school and post-secondary education. Twenty co-operative community kindergartens were provided with grants for the payment of instructors' salaries and the purchase of supplies. Grants and bursaries totalling \$149,900 have been provided to 157 Yukon students attending post-secondary educational institutions outside the Territory. In addition, eligibility certificates for Canada student loans were issued to 25 individuals.

Plans for 1973

A number of construction projects are planned this year. These include the completion and furnishing of the new junior-secondary school in Whitehorse and additions to the schools at Teslin and Watson Lake. This will eliminate the need for the portable classrooms presently in use at the latter schools and will provide for the relatively stable growth predicated for both communities. Finally, it is anticipated that preliminary work will be undertaken to prepare for the reconstruction of and addition to the Dawson City School.

Vocational training

The Yukon Vocational and Technical Training Centre in Whitehorse offers 15 pre-employment courses on a regular basis each year. Eleven of the courses are 10 months long, three are five months long (offered twice a year), and one course is three months long (offered three times a year). Academic upgrading courses are offered to meet four different needs:

- basic literacy for people with a Grade 0–4 level of education,
- basic education with lifeskills to a Grade 10 level for people with Grade 5–9 level of education,
- basic education with science supplement for those who required only a few months to bring them to a Grade 10 level in Mathematics, Science and English,
- B.T.S.D. IV for people with at least a Grade 10 who, having not attended school for a number of years wish to acquire the necessary subjects for entry as a mature student to a technical school or university.

Four of the pre-employment courses are trades courses and on successful completion provides one year credit towards apprenticeship, the welding course, for example qualifies a person for a B.C. — D.P.W. No. 3 welding ticket; three courses are commercial; and the nursing assistant's course provides a certificate recognized in other provinces. The remaining courses, such as arts and crafts, cooking, drafting, heavy equipment operating, small business management and basic mining, provide a certificate of training.

Basic Prospecting courses were provided in the communities of Upper Liard and Pelly Crossing. Basic literacy courses were provided in Ross River and the Whitehorse Native Village, and a basic carpentry course was provided in Carcross. One house was

completed at the Yukon Vocational and Technical Training Centre which is to be moved and used as a residence for Yukon Territorial government employees in Haines Junction. A second house was started in Whitehorse. These houses were constructed by the building construction course as practical work projects. A third house was constructed in Carcross by students in the basic carpentry course.

In addition to the three, five and ten month courses, a number of shorter term courses of 4–12 weeks were offered in forest fire suppression, child care, home management, and game guiding.

In the term year September 1971 to June 1972, a total of 32 courses was given with a total enrolment of 552 students. In the term year of 1972/73, 318 students were enrolled in 24 courses to the end of December 1972.

Industrial training

Three hundred and ten students were enrolled in 18 special one week courses conducted at various locations in the Yukon.

Two management courses, seven foremanship courses and nine special heavy equipment mechanic upgrading and updating courses were provided in Whitehorse; two foremanship courses in Clinton Creek; and two foremanship courses in Faro.

Under the Yukon Apprentice Training Ordinance, 26 apprentices in seven trades were registered in 1972. Trade qualification examinations were conducted at various locations. A total of 250 tradesmen have qualified for certificates and 13 have received the Interprovincial Red Seal endorsement.

Night school

A total of 654 persons enrolled in 41 courses conducted throughout the Yukon with 277 enrolled in vocational courses and 377 enrolled in vocational courses.

Plans for 1973

The academic upgrading courses with modified lifeskills will be provided in seven communities outside Whitehorse, and basic levels of carving and ceramics will be provided in as many communities as possible. Whenever possible, local people from the respective communities will be trained as instructors for the upgrading courses.

Home management courses will be made available to residents of communities, beginning with those communities receiving houses under the Yukon Housing Corporation.

Tradesman Qualification Examination and Certification procedures will be introduced for at least two additional trades including construction, electrician and industrial mechanic (Millwright) trades.

Continued emphasis will be placed on special one-week courses, with instruction be provided by professional agencies. The courses will be provided at strategic locations throughout the Yukon. Emphasis will be placed on the tradesman — mechanic special updating courses.

Recreation Branch

The 1972 Arctic Winter Games held in Whitehorse was the largest sporting event ever held in the North, as representatives Arctic Quebec joined the Yukon, North Territories and Alaska in official competition. The recreation branch assisted in the preparation of the successful Yukon team in the Games through training clinics for different sports and financial aid to the Yukon contingent.

Sports development continued in the Yukon and 22 Territorial associations met late in the year and approved the formation of a Yukon Sports Federation early in 1973.

Other recreation programs also showed expansion and improvement. The Branch was involved in leadership training for summer playground and day camp activities and the provision of swimming activities smaller communities through six "portable" pools — three of them now housed in prefabricated pool buildings.

The first Yukon-wide recreation conference was held in 1972 and indicated continuing interest in expanded recreation opportunities for the Territory.

Future plans

In 1973 the Yukon Sport Federation joined the Branch in preparing our participation in the 1973 Canada Games in August and at longer range, the 1974 Arctic Winter Games at Anchorage, Alaska.

The second Yukon Recreation Conference will discuss the further development of recreation including cultural activities be included in the Branch's program on a regular basis. Two more portable swimming pools will go into operation bringing the total to eight in Yukon.

ARTMENT OF HEALTH, WELFARE REHABILITATION

ctions Branch

nsibilities

o provide adult and juvenile probation
es, and to supervise parolees and
ationers from federal and provincial
utions and jurisdictions.
o operate a juvenile training home for
and female juveniles declared by the
s to be delinquent.
o operate a medium-security institution;
g for the custody, care and treat-
of persons who have appeared before
iorial courts and have been remanded
ntended to terms of imprisonment of
an two years.

term Plans

e continued use and extension of
bation services with involvement by
mmunity groups, and the use of
unter probation workers. With the
operation of educators the schools
uld teach the correctional function
upils, with a view to helping them
erstand their civic responsibilities.

s hoped that the use of the planned
enile training home as a comprehensive
ility for boys and girls will take care of
se who have not been otherwise
ned and kept clear of the courts.

y intended to maintain the medium-
urity institution as a clearing house,
itting those inmates to day-release
grams who are capable of entering into
program. Outside activities will
olve community projects and attempts
be made to instill work habits, self-
fidence and self-discipline by means of
ership training in wilderness areas.

Review of 1972 Operations

ing 1972 a total of 372 admissions
orded at Whitehorse Correctional
tion:

es	247 sentences
	106 remanded
ales	11 sentenced
	8 remanded

average length of sentence decreased
y from 95.71 days in 1971 to 91.53
1972 for males and from 70.20 days
l for females to 23.3 days in 1972.
probation work caseload was main-
at a comparatively high level. On 31

December 1972 the caseload was 246,
compared to 234 on 31 December 1971.

During the year the demand on the
juvenile training home became heavier and
the facilities taxed when the home was
declared a refuge for transients and run-
aways pending their appearance before a
justice. The completion of the new facility is
eagerly anticipated.

Plans for 1973

It is planned to extend the pilot survival
training course for young adults and male
juvenile offenders to include youngsters
placed on probation who may be in need of
guidance. The terrain of the Yukon lends
itself particularly to this type of venture and
it is hoped that there will be positive results
with this particularly difficult group of
young people.

Health Services Branch

Responsibilities

Yukon Hospital Insurance Services

Hospital care for the acutely ill, where
medically necessary, is provided at no cost
to residents at any approved hospital in
Canada. Payment by the plan outside

Canada shall not exceed the per diem rate of
an approved hospital in the Territory.

The plan also provides for out-patient
hospital facilities for the diagnosis and
treatment of an injury, illness or disability
together with any consultation which may
be necessary to achieve this.

Yukon Health Care Insurance Plan

Popularly referred to as Medicare the plan
provides, without geographic restriction,
insured services which are medically neces-
sary. As with hospital insurance, payments
outside Canada are limited to the amount
which would be paid for the same or a
similar service in the Yukon Territory.

Review of 1972 Operations

Yukon Hospital Insurance Services

The number of hospital beds in the
Territory remain unchanged at 148. Hospi-
tals are located within reasonable access of
all residents of the Territory.

There was a slight decrease in the number
of persons receiving in-patient treatment;
combined with a decrease in the average
length of stay, the result was a decrease of
16 per cent in-patient days.

Services

	1972	1971	Increase (Decrease)
In-Patients			
<i>Adult & Children</i>			
Patient days	24,438	29,241	(4,803)
Separations	3,794	3,970	(176)
Average length of stay	6.4	7.4	(1.0)
<i>Newborn</i>			
Patient days	2,584	3,143	(559)
Separations	451	524	(73)
Average length of stay	5.7	6.0	(.3)
Out-Patients			
Diagnostic	6,454	5,384	1,070
Accident	2,138	2,086	52
Accident 3rd party	46	53	(7)
	8,638	7,523	1,115

Costs

In-patient services	1,201,556	1,093,651	107,905
Out-patient services	103,350	97,576	5,774
Administration	39,994	34,847	5,147
	1,344,900	1,226,074	118,826
Per capita cost	70.78	72.12	(1.34)

Yukon Health Care Insurance Plan

The plan was introduced on 1 April 1972 and, as with any new operation, initial difficulties were encountered largely due to inexperience and unfamiliarity with the operation of the plan. Minor procedural changes have been made as required but no major changes have been necessary.

Social Welfare Branch

Responsibilities

This branch provides a full range of public welfare services to all areas of the Yukon Territory. The major social welfare programs of social assistance, categorical assistance and family and child welfare services are administered within the framework of the Social Assistance Ordinance, the Blind Persons Allowance Ordinance, the Disabled Persons Allowance Ordinance and the Child Welfare Ordinance and related regulations.

These three major programs encompass a broad range of social services and supportive resources which are essential to an effective social welfare program. The operational headquarters of the Branch is located in Whitehorse and comprises the:

- division of administration,
- metropolitan services division,
- adoption and special placements division,
- field services division, and
- homes and institutions division.

Field offices are strategically located throughout the Territory to provide services within specific geographic regions and thus ensure that all outlying areas are adequately serviced. Communities along the Alaska Highway three hundred miles north to the Alaska border, and one hundred miles south of Metro Whitehorse, are serviced out of the Metro Whitehorse Headquarters operation.

The Social Welfare Branch is also responsible for the operation of the following geriatric and child-care facilities:

Whitehorse

- two senior citizens homes — maximum capacity 60 persons,
- children's receiving home/assessment centre — capacity 15,
- three group homes — capacity 8 children each

Dawson City

- nursing home/senior citizens home Complex — capacity 25
- children's receiving home — capacity 8

Mayo

- children's receiving home — capacity 8

Watson Lake

- children's receiving home — capacity 8

Total staff of the branch in 1972, including institutional staff, was 60. All government-owned child-care facilities in the Territory are operated by houseparents on a private contractual arrangement with the branch.

Review of 1972 Operations

The scope of the work of the Social Welfare Branch and its areas of responsibilities increased considerably during 1972. The constancy of the Yukon's economic and population growth continues to place a greater demand on the branch for social services, particularly in the highly specialized area of family and child welfare.

The total caseload for all programs extended by the branch was 2,553 cases representing services to 5,666 persons. In comparison with the previous year, this is an increase of 271 cases (12%) and 1,026 persons. The caseload figures by category of service are given below.

The Social Assistance program experienced a caseload increase of 31.5 per cent during the year. The program caseload was 1,244 cases involving 2,555 recipients. This represented an increase of 298 cases and 722 recipients in comparison with the previous year. The per capita cost was \$18.51 compared to \$10.74 in the previous year. The increase in social assistance costs can be related to a rise in the number of unemployed employables as well as an increase in the number of widows, deserted wives and

other single parent families who require long term assistance or supplementation of their income. The increase in expenditure was also attributable to a substantial increase in costs of rental accommodation for families on assistance, and to the continuing rise in the costs of food and other items of basic maintenance.

During the year the branch introduced a new concept under its social assistance program which established a Minimum Annual Subsistence Level for pensioners receipt of Old Age Security and the Federal Guaranteed Income Supplement, and for non-pensioners who, because of age, chronic illness, physical or mental impairment or other forms of incapacitation or social inadequacy, are considered to be permanently excluded from the labour force. This effect established an income floor below which no one in these categories would

The basis for developing a minimum subsistence level was twofold. Firstly, to eliminate the differential between the established income floor and the combined amounts of old age security and the guaranteed income supplement made a Yukon pensioner eligible for supplementary allowance which increased the dollar benefit of his pension in comparison with a pensioner in the southern provinces where the cost of living was considerably lower. Secondly, it provided the pensioner and others who were considered to be in the permanent labour force exclusion category with a basic income that was in line with the poverty level established by the Economic Council of Canada. In situations where their actual needs exceed t

Category of Service	Total caseload carried	N p in
<i>Family & Child Welfare</i>		
children-in-care	482	
child protection	133	
foster homes approved	173	
Adoption Services —		
— agency placements	50	
— step-parent adoptions	18	
— adoption homes approved	37	
unmarried parents	88	
family service	310	
<i>Public Assistance</i>		
social assistance	1,244	
blind persons' allowance	9	
disabled persons' allowance	9	
Total	2,533	

c subsistence level, the allowance can be implemented from the general assistance program to ensure that their total needs are met.

social assistance rates were increased during the year to reflect changes in living costs, consumption patterns and improvements in the general standard of living. Social work services, which form an integral part of the social assistance program and which are designed to prevent dependency on the public agency, provide support and encouragement in the rehabilitation and return to self-dependence of the employable welfare recipient.

In the family and child welfare services program, the caseload totalled 1,291 cases, representing services to 3,093 adults and children, a decrease of 32 cases. Services provided under this program consist of family service, child protection, child-care, foster home and adoption home services, services to unmarried parents. To implement these services the branch has established and operates a number of child-care facilities in various communities in the Territory, and also has a well developed foster-home program. There were 482 children in care during the year, a decrease of 17 children compared to the previous year. This reflects the high level of prevention services provided by the social work staff as well as a more aggressive adoption placement program which has made it possible during the past year to find adoptive homes for a considerable number of out-of-place and handicapped children who had been in foster care for some time. Total cost of child care provided were 114,806 at an average per diem cost of \$4.24 per child. The nursing and senior citizens homes operated by the branch provided a total of 100 days of accommodation and care for an average occupancy rate of 70 per cent. Total operating costs for all three facilities amounted to \$280,000, an average per diem cost of \$14.75.

During the year in review, the branch continued through its plan to provide a more adequate program of social services to the remote areas by establishing a district office at Mayo and at Ross River. This reduces the large geographic areas previously serviced by the Dawson City and Watson Lake field offices and will ensure frequent coverage and a more effective service to all communities. Welfare expenditures increased by \$100,000 over the previous year for a total of \$484,000. Based on the total caseload

for the year, the average cost of all services amounted to \$581 as compared with \$515 the previous year. The per capita cost was \$80.54 compared with the previous year's per capita cost of \$65.30. Recoveries under cost-shared programs and other agreements amounted to \$1,047,000 for the year.

Plans for 1973

Plans are under way to install an elevator and to expand the Macaulay Lodge senior citizens home in Whitehorse to provide intermediate care for elderly persons requiring supervision and minimal nursing care. This project is due for completion in October 1973.

New office quarters will also be provided for the field offices in Dawson City and Watson Lake which will enable the branch to provide an improved level of service to the people in these areas.

The Yukon Territory will also host the annual conference of the Provincial-Territorial Directors of Child Welfare in June 1973. In addition, the branch plans to hold a number of seminars in special areas of social services as part of an on-going staff development program and for the benefit of co-lateral agencies and other disciplines.

Long-term Plans

Program evaluation and development of services will continue in light of existing needs and changing socio-economic conditions. Because social development is a very important part of northern development, planning will be directed towards the development of sound social policies and positive welfare programs which will play an extremely vital role in the growth and development of the Yukon Territory and the improvement in the quality of life.

DEPARTMENT OF HIGHWAYS AND PUBLIC WORKS

Responsibilities

With the exception of municipal roads, to maintain and improve all roads in the Yukon Territory. To maintain and improve all buildings owned by the Territory and to design and construct all new buildings for the Territorial Government. To provide professional engineering services and advice to the Commissioner and all Territorial departments. To co-ordinate federally-financed roads or public works projects with appropriate branches of the Department of Indian Affairs and Northern Development under the Federal-Territorial Engineering

Services Agreement and the Remote Airports Program. To keep in contact with the federal Department of Public Works as required under the Alaska Highway Maintenance Agreement in connection with the maintenance of the Yukon section of the Alaska Highway and the Yukon and B.C. section of the Haines Road.

Long-term Plans

To continue to up-grade the existing road system by improving all grades and alignments and by widening to a point where these roads are ready for paving. To construct new airstrips and to improve existing ones throughout the Territory to keep pace with increased use and new needs created by rapid economic development of the Territory. To improve the appearance of existing buildings and grounds, to reconstruct and alter buildings in line with changing needs and to construct new buildings for all Territorial departments on a planned basis.

Review of 1972 Operations

With the transfer of maintenance responsibility for the Alaska Highway and Haines Road from the federal Department of Public Works to the Government of the Yukon Territory, the road network to be maintained by Territorial forces has increased to 2,377 miles. This has caused a considerable increase in labour force and equipment holdings. The department employed 257 permanent, nine seasonal and 278 casual employees, for a total of 544 employees at the end of July 1972, with an additional 60 permanent positions, mainly in the Highways Maintenance Section remaining vacant. As in previous years a 55 ton ferry crossed the Yukon River at Dawson and a 36 ton cable ferry operated across the Pelly River at Ross River. In addition to the Dawson City ferry, a skyline was operated during fall freeze-up and spring break-up and an ice bridge was constructed for the winter months. In addition to 30 airstrips maintained by the Territory, the airports at Mayo and Dawson City were maintained on behalf of M.O.T.

To accommodate increasing tourist demands for the Klondike area, the Dawson City airport was extended from 4,000 to 5,000 feet to allow larger type aircraft to land during the summer months. The construction of a new airport near the village of Faro commenced in the fall of 1972 with a completion date in June 1973. Minor deficiencies of the Old Crow airport construction carried out during the 2 previous

years were completed. This airport is now fully operational. The Beaver Creek airport, a point of entry from Alaska, was improved and lengthened to 5,000 feet with the assistance of the Operators' Course at the Vocational Training School.

The road reconstruction program totalled \$2,500,000 and included paving Mile 0 to Mile 10 on the Whitehorse-Keno Road, reconstruction to a trunk highway standard of the Whitehorse-Keno Road from Mile 168.5 to Mile 191, upgrading of the Campbell Highway from Mile 258 to Mile 318 and minor realignments and widening of the Atlin and Tagish Roads. Building construction included a \$1,000,000 extension to the Jack Hulland School in Whitehorse, a \$500,000 addition to the Selkirk Street School in Whitehorse, the commencement of construction of a new junior high school in Whitehorse which will cost approximately \$1,250,000 on completion, the construction of an Archives Building and an addition to the Yukon Library at a cost of \$500,000 and the completion of a number of minor projects started in previous years. Miscellaneous new projects included the construction of a number of residences for the Yukon Forest Service, the addition to a staff housing apartment building in Dawson City, the construction of Weigh Scale Stations in Haines Junction and Watson Lake, the construction of a three bedroom teacher-age in Haines Junction and others.

The Building Maintenance Section of the Department continued to maintain all buildings owned by the Territory with a staff of 32 tradesmen.

The mechanical section of the department continued to repair and overhaul all Territorial equipment out of the two main workshops in Whitehorse, the workshop in Dawson City and workshop in Watson Lake.

The Municipal Engineering Section of the department continued to assist the Department of Local Government in community planning, land disposal and planning of water and sewer extensions, new water and sewer systems and treatment planning.

Plans for 1973

The Whitehorse-Keno Road will be continued with 12 miles of new paving. The upgrading of the Campbell Highway will be continued from Mile 318 to Mile 362. The ground improvement program will be continued. The improvement of the Atlin and Tagish Roads and the upgrading of recreational roads will also be continued.

The dust control program on Territorial roads will be increased to a total application of approximately 8,000 tons of calcium chloride to provide safer road conditions on road sections with a traffic density of over 250 vehicles per day.

The building construction program as proposed and listed by other departments will be carried out.

DEPARTMENT OF LEGAL AFFAIRS

Responsibilities

The department is responsible for administering justice in the Territorial court system which includes the Yukon Court of Appeal, the Supreme Court, Magistrate's Court and Justice of the Peace courts. The Yukon Court of Appeal normally sits in Vancouver. The Supreme Court and Magistrate's Court are established in Whitehorse but travel on circuit when necessary. Justices of the peace are appointed and sit in all communities in the Territory. Small debt officials with jurisdiction up to \$500 sit in Whitehorse, Watson Lake and Dawson City. The magistrate and some of the justices of the peace hold appointments as juvenile court judges and deal with juvenile offenders pursuant to the Juvenile Delinquents Act of Canada.

The department provides legal advice and services to the Commissioner, the Territorial Council, and all departments of the Government. All legal documents and Ordinances and Regulations are drafted in the department or are prepared under its supervision.

Review of 1972 Operations

The department was created on 1 April 1971 to take over the responsibilities formerly discharged by the legal adviser on the one hand and the Federal Department of Justice in the Territory in relation to Territorial matters on the other hand. The responsibilities of the Federal Department were assigned to the Territorial Government, except for the prosecution of criminal code and federal offences and the appointment of BNA Act judges. The federal Department of Justice maintains a Crown Prosecutor in the Territory.

The reorganization of the Department of Justice effected in 1971 proved its worth in the present year. Further changes were made this year by transferring accounting control from treasury to the legal department. Court reporting at the Supreme Court level, previously performed by an outside firm on

contract, was taken over and a court reporter appointed. A legal seminar, which was well attended and very successful, was held to educate officers of the Department of Social Welfare and Corrections in court procedures and requirements for handling court applications. A Magistrate and Justice of the Peace conference was held in Whitehorse in which there was continuing emphasis on the procedures required under the Bail Reform Act. The Chief Crown Attorney for the Ottawa Carleton district was brought in to provide the necessary expert assistance.

With the resignation of the incumbent, a new appointment was made to the post of Judicial Administrator.

A police contract was signed between the Territory and the Royal Canadian Mounted Police. The new form is more closely modelled on the standard Provincial R.C.M.P. Police agreements. Under this agreement the Territorial Government has acquired responsibility for the administration of justice in relation to Territorial matters, leaving direction in federal matters to the Attorney General of Canada.

Plans for 1973

The present legal aid scheme will be extended to cover, for the first time, legal aid in civil matters. Under a proposed compensation plan, persons who suffer through the commission of a crime by another will be given the right to compensation in cases covered by the scheme.

In the long term it is hoped to improve the quality of service in the department providing a second, appropriately staffed Magistrate's Court.

DEPARTMENT OF LIQUOR CONTROL

Responsibilities

The Liquor Control Department regulates the importing, retailing and distribution of all alcoholic beverages within the jurisdiction of the Liquor Ordinance and attendant regulations.

Long-term Plans

To control the number of licensed establishments so that the quality of lodging and food establishments in the Territory can be

proved both for the travelling public and territorial residents.

To improve sales and reduce operating costs so that more money will accrue to the government.

To exercise more preventive control in all cases pertaining to the liquor ordinance, the results of which would be fewer infringements of this ordinance.

Review of 1972 Operations

A gradual upgrading of licenced premises took place through increased inspections and discussions with licencees. The Yukon Liquor Board, comprised of three lay members, expanded into the area of licence renewals.

Tourist facilities were improved by the addition of various outlets in towns and along the highway, as well as by general improvements to several outlets.

The central warehouse moved to larger quarters where an expanded stock and a wider variety of brands, especially in wines, was made possible. The larger establishment allows for more efficient, faster service at licenced outlets and liquor stores.

Plans for 1973

It is hoped to begin the practice of having applicants for licences, including applicants for renewals, appear before the Liquor Board to be interviewed. The result should be closer and more effective liaison between licencee, inspector, liquor control and the liquor board.

DEPARTMENT OF LOCAL GOVERNMENT

Local Government Branch

Responsibilities

To provide municipal services for all unorganized communities in the Territory

To assist in the establishment and operation of municipal services in Local Improvement Districts

To maintain an advisory service and inspect municipalities to ensure compliance with ordinances pertaining to municipalities

To develop policies so that municipalities of various sizes can provide economical services to their taxpayers

Long-term Plans

- to provide and continually update municipal procedure manuals for the guidance of officers in smaller communities
- to implement general plans, and zoning regulations in all municipalities and unorganized communities, to ensure that development takes place in an orderly manner
- to promote local self-government establishment, giving local people the authority and responsibility to deal with local matters
- to improve the quality of life enjoyed by residents of Yukon communities through orderly installation of urban facilities and utilities to each community where economically justifiable

Review of 1972 Operations

- A new municipal ordinance and taxation ordinance have been passed by Territorial council and are now in effect.
- Discussions were initiated with three unorganized communities regarding the possibility of forming local improvement districts as the first level of self-government. Two applications for a change in status were received recently and the requested changes are being legalized.
- Two major announcements have had significant impact on Yukon communities. The proposed formation of the Kluane National Park will require a major upgrading of facilities at Haines Junction which will become the Park headquarters. Historic Sites' announcement regarding a major re-development of historic buildings in Dawson City will require planning for that community such that the development of historic buildings and the normal routine of the residents can proceed without conflict. Both announcements have received enthusiastic community support.

Plans for 1973

- to establish close liaison with native agencies to promote the joint-use concept of municipal services
- to introduce and provide training to municipalities for more advanced accounting procedures

- to review the status of local improvement districts and develop this type of self-government in a number of existing unorganized communities
- to review the numerous municipal services of each community to ensure that the most economical methods are being followed, and that residents have adequate services
- to upgrade operational and maintenance procedures for utility services

Protective Services Branch

Responsibilities

- to implement and administer an effective fire prevention program to reduce loss of life and property
- to review building plans and specifications for conformity with Territorial and national building and electrical standards
- to maintain ongoing programs for the improvement of fire prevention, building, and electrical standards within buildings
- to disseminate information to the general public and industry for reducing domestic and industrial fires

Review of 1972 Operations

79 fires were reported in 1972, a decrease of 18 as compared to the 1971 total of 97.

Fire losses in 1972 amounted to \$382,236.90, a reduction of \$277,530.54 as compared to the 1971 loss of \$659,767.44. Of the total 1972 loss, \$283,829.90 was covered by insurance.

One fire fatality and three injuries as a result of fire were recorded in 1972.

The largest fire loss, \$90,000.00, resulted in the destruction of a sawmill in the district of Teslin.

Faro Town Volunteer Fire Department was awarded an honourable mention in the 1972 National Fire Prevention Competition, Division F. The award is in recognition of all-round efficiency in fire prevention.

The program to upgrade firefighting facilities within the Indian communities is almost completed. These areas will be visited on a regular basis by members of the fire marshal's office to upgrade the firefighting skills of the residents.

Plans for 1973

- The provision of firefighting equipment for the major communities continues at a rapid pace. It is expected this program will be completed in 1974.
- A close liaison will be established with the personnel responsible for upgrading and providing water systems in designated areas to ensure an adequate water flow when an outbreak of fire occurs.
- With the proposed adoption of the National Building Code, 1970 edition and/or the Canada Building Code for the North, 1968 edition, increased emphasis will be placed on upgrading all places of public assembly.

*Community Planning and Land Disposal Services***Responsibilities**

- The planning of Yukon communities and land disposal areas to permit orderly, economical development.
- The sale, lease or other disposition of lands under the administration, control and management of the Commissioner of the Yukon Territory.

Long-term Plans

- To prepare community plans and zoning control legislation for every Yukon community and ensure orderly land use in communities and in the peripheral areas.
- To establish a land disposal policy and to administer the disposition of land to permit the orderly, efficient and economic use of all areas in the Yukon.

Review of 1972 Operations

Monies received from all land transactions in 1972 amounted to \$242,501.48. Some 363 applications, titles, assignments and extensions were processed, of which 113 were Notifications for Title for Riverdale subdivision in the City of Whitehorse.

Various residential lots were made available to the Yukon Housing Corporation for Low-Cost Housing and Rental-Purchase Housing throughout Yukon communities.

A new Lands Ordinance and Lands Disposal Regulations were prepared and adopted for use by the branch.

A planning consultant started a community plan for Haines Junction in 1972.

The Yukon Water Pollution Control and Abatement Report, a study in progress, will provide for adequate sewage treatment control for all Yukon communities. The study will be completed early in 1973.

Plans for 1973

- The formal adoption of new regulations governing the sale and lease of lands under the jurisdiction of the Commissioner will appreciably alter land disposition. The majority of lands will be sold by public tender. The leasing of Yukon lands will conform to a definite set of standards.

- New maps detailing available lands both within and beyond the metropolitan area will be prepared.
- A number of Yukon communities have been selected for the preparation of community plans and Zoning By-laws Area Development Regulations. Planning consultants will be used during 1973.

Assessment Branch

Due to the 1972 revision of the Taxation Ordinance the assessment branch assumes the sole responsibility for all real property taxation assessment in the Yukon.

The following schedule shows the total assessed values in each municipality and in the Yukon:

1973 Assessment figures**1) Municipalities***City of Whitehorse*

taxable land and improvements	\$39,670,948
federal land and improvements	9,980,460
territorial land and improvements	10,304,400
religious land and improvements	251,040
other	1,330,030
city land and improvements	913,280

\$62,450,158*City of Dawson*

taxable land and improvements	\$ 827,010
federal land and improvements	325,840
territorial land and improvements	665,850
historic sites	74,470
C.N.T.	19,350
N.C.P.C.	40,230
religious and other	17,790

\$ 1,970,540*Village of Faro*

taxable land and improvements	\$ 4,254,240
territorial land and improvements	874,620
federal land and improvements	258,640
C.N.T.	26,170
N.C.P.C.	91,380
town of Faro	91,030

\$ 5,596,080

Unincorporated areas in the Yukon

taxable land and improvements	\$11,444,054	
federal land and improvements	1,808,470	
territorial land and improvements	3,470,052	
religious, community and others	338,200	
		\$17,060,776
		87,077,554

Mining properties

improvements	\$14,200,164	
		\$14,200,164
Total		\$101,277,718

Long-range plans include a detailed comprehensive check of all matters relating to assessments, building costs, land values and other factors.

DEPARTMENT OF TERRITORIAL SECRETARY AND REGISTRAR GENERAL

The department is responsible for the following:

Registration Services

- companies
- securities
- societies
- vital statistics
- business licences
- co-operative associations
- credit unions
- partnerships
- document registrations
- motion pictures
- insurance

Inspection Services

- labour standards
- liquor
- steam boilers
- public health

Motor Vehicles

- transport public utilities
- driving program
- Watson Lake checkstation and Whitehorse weigh scales

Workmen's Compensation**Public Administrator****Records Office****Information Canada**

The primary operations are located at headquarters in Whitehorse, with agents located at Watson Lake, Haines Junction,

Mayo, Dawson, Faro and weighscale operators at Watson Lake, Whitehorse and Haines Junction on the Alaska Highway.

Long-term Plans

The long term plans of the department are to establish a Workmen's Compensation Fund under direct control of the Government of the Yukon Territory. The fund will operate as does the provincial one, except that the Yukon Territorial Government will use the Alberta Workmen's Compensation Board as the referee.

Review of 1972 Operations*Registration Services*

- Under the Business Licence Ordinance, a total of 375 licences were issued, of which 295 varying classes were resident, 24 non-resident and 56 were classed as tourist establishments.
- Under the Insurance Ordinance, 40 salesmen and 4 Officials were licenced.
- Under the Securities Ordinance, 6 salesmen, 3 brokers and 1 security-issuer were licensed, 16 new prospectuses were filed and 11 amendments to Prospectuses were received and registered.
- Under the Societies Ordinance, 18 new societies were incorporated and 46 societies filed financial statements.
- Under the Motion Pictures Ordinance, 3 establishments and 3 operators were licensed.

- Under the Companies Ordinance, 67 companies became new Yukon Incorporations, 96 were licensed extra-territorially, a total of 163 new companies.

- Under the Vital Statistics Ordinance, 515 certificates of registration of birth; 112 certificates of registration of death; and 185 marriages were recorded by the Registrar. Also indexed with the Dominion Bureau of Statistics were 54 adoptions, 17 name changes and 14 delayed registrations of birth.

- Under the Bills of Sale Ordinance, Conditional Sales Ordinance, Assignment of Book Debts Ordinance and Garagemen's Lien Ordinance, 3,456 documents were registered.

- Under the Partnership Ordinance, 11 partnerships were filed.

- Recorded in the Professional Registrar were licences issued to 2 chiropractors, 4 dentists, 3 dental hygienists, 23 doctors, 58 lawyers, 3 optometrists and 7 pharmacists.

Inspection Services

Under the Labour Standards Ordinance, a total of 285 wage claims were investigated, and a total of \$75,000 in unpaid wages were collected on behalf of employees; 120 labour inspections were made.

Under the Liquor Ordinance, 350 separate inspections of licenced premises were made.

There were 72 inspections carried out under the Workmen's Compensation Ordinance, 75 inspections were carried out under the Accident Prevention Regulations.

There were 48 inspections carried out under the Business Licence Ordinance and 36 under the Companies Ordinance.

Under the Fuel Oil Tax Ordinance, 15 inspections and 10 investigations were made resulting in the collection of unpaid taxes in the amount of \$16,145.50.

Under the Elevator and Fixed Conveyance Ordinance, 30 inspections were carried out.

Under the Steam Boilers Ordinance, 275 inspections were made.

Under the Motor Vehicle Ordinance, 25 inspections were carried out.

A total of 127 prosecutions were entered as follows:

Labour Standards Ordinance	90
Liquor Ordinance	1
Business Licence Ordinance	10
Fuel Oil Tax Ordinance	15
Motor Vehicle Ordinance	11

Workmen's Compensation Ordinance

Under the Workmen's Compensation Ordinance, there were 1,458 accidents during the calendar year 1972, a decrease of 72 over the same period as last year.

Public Administrator

The Public Administrator commenced the calendar year with 90 current files to which were added 78 files consisting of 62 deceased estates, nine for mentally incompetent patients, two minors and five missing persons. During the year files were closed in relation to 44 deceased estates, eight patients, four minors and two missing persons, leaving a total of 110 current files being maintained on 31 December 1972.

Motor Vehicles

Under the Motor Vehicles Ordinance, 24,750 licences, certifications and registrations were issued.

The Watson Lake weight scale operates on a continuous 24 hour basis. Three operators, one supervisor and one casual, check all trucks with a gross vehicle weight of 20,000 lbs. or more, issued permits and assess and collect fuel tax. A total of 14,639 vehicles were checked and recorded. Revenue amounting to \$169,101.84 was derived from all sources.

The Whitehorse weighscale operates the same hours and with the same number of employees. A total of 35,500 vehicles were

checked and recorded. Revenue amounting to \$45,844.32 was derived from all sources.

Records Office

The Records Office and its two sub-stations opened 397 new files and handled 432,628 pieces of mail. The volume of mail increased by 58,866 pieces over the previous year.

The implementation of a Records Management Program during 1972 resulted in the transfer of 2,000 cubic feet of closed records from offices and storage areas to the Records Centre for interim storage until due for destruction or transfer to the archives. This program has alleviated space problems in various government departments and at the same time has reduced the costs of handling and storing records and documents.

Information Canada

The Territorial Secretary, provides various printing equipment, making it possible to handle the volume of printing required by the government. Information Canada is responsible for the printing of all Ordinances, amendments to the Ordinances of the Yukon Territory, the printing of regulations, votes and proceedings of the Council Sessions and is responsible for approving all publications of Gazette Notices as required by certain statutes of the Yukon.

DEPARTMENT OF TOURISM, CONSERVATION AND INFORMATION SERVICES

Game Branch

Responsibilities

This Branch is responsible for the administration and enforcement of the Game Ordinance, Brands Ordinance, Fur Export, Tax Ordinance, Pounds Ordinance, Migratory Birds Convention Act and Freshwater Fishery Regulations, as well as conducting programs that are necessary to proper wildlife resource management.

Long-term Plans

- To expand areas of enforcement and administration to a point where all travelled and settled portions of the Territory are provided with adequate wildlife protection and conservation services for all forms of wildlife and freshwater fish.
- To collect data and inaugurate scientific programs and related studies to be carried

out by Y.T.G. biologist and to assist other bodies engaged in biological work in the Territory.

- To co-ordinate the activities of trapper guides, outfitters, hunters and sport fishing guides to ensure the most efficient and satisfactory use of the renewable wildlife resources.

Review of 1972 Operations

A wildlife biologist and technician were taken on staff in the fall of 1972 and certain management programs were initiated.

A hunter check station was manned on the Dempster Highway during October, staffed by personnel from the Canadian Wildlife Service and Game Branch. Considerable studies are being conducted regarding the Porcupine caribou herd, their migration pattern and life style, in light of the proposed pipeline.

Aerial game surveys have commenced in the southwest Yukon and along the fringe of the new Klunne National Park.

Installation of a single-side band radio system is nearing completion and, once in complete operation, will prove invaluable the efficiency of this branch.

Regular patrols are being conducted along the Arctic coast with visits to both DEW sites, Herschel Island and exploration camps. The transient polar bear population is receiving considerable attention on these patrols also.

Plans for 1973

A new detachment will be created in the spring and administrative support staff will be added to the Whitehorse office. Considerable time and effort will be channelled toward the big game census commencing with areas of highest game densities, such as the southwest Yukon and moose populations in the southeast Yukon as well as the Porcupine caribou herd.

Library Services Branch

Responsibilities

To provide library services to the public and to schools throughout the Yukon, and to provide archival services under the authority of the Archives Ordinance.

Long-term Plans

To work towards providing, as closely as possible under Territorial conditions, public and school library service at the level of accepted standards of library service. To

operate, through the agency of the Yukon Archives, in the the development of a territorial government system of records management for current, non-current, and permanent government records; and to acquire and maintain a collection of the history of the Yukon as recorded in non-governmental sources.

Review of 1972 Operations

With a stock of approximately 80,000 catalogued books, the Yukon Regional Library served 75 outlets in various Yukon communities. On a rotating basis, 24,847 books were shipped to these communities. Cataloguing and processing of 14,717 items of library materials (new books, added copies, paperbacks, and audio-visual materials) was completed. The members of the Whitehorse Public library borrowed 391 books during the year. The film library distributed 7,491 16 mm films throughout the Territory which were viewed by a total of 153,513 persons. A construction project to house the Yukon Archives and to provide additional space was completed and opened in December 1972. The Library Services Branch hosted the annual meeting of the Yukon Library Association in March 1972. The Art Gallery of the Whitehorse Public Library exhibited a major exhibition of modern art from the NWT, Alaska, and during the Arctic Winter Games and mounted an exhibition of Yukon artist Ted Brown's paintings to five centres in northern Canada. The Dawson City Public Library relocated in new and expanded facilities. Federal OFY Grants from the National Film Board allowed the Film Library to hire an itinerant projectionist for the summer, and Federal LIP grants permitted the Archives to participate with the Indian Friendship Centre, Skookum Jim, in an oral history program.

Plans for 1973

An additional professional staff person will permit increased concentration on special programs in school and public library service, especially for children and young people, and further development of training programs for branch library workers. The effect of both areas of concentration is the increased utilization of library facilities.

Tourism and Information Branch

Responsibilities

The branch is responsible for promoting travel to the Yukon Territory and encouraging the development of tourist attractions and facilities within the Territory.

In addition, it is responsible for public information on government activities.

Long-term Plans

Continued advertising and promotion to stimulate travel to the Yukon, programs designed to assist the development of the Territory's tourist facilities and services, and provision of an adequate information service.

Review of 1972 Operations

Tourism showed a twenty percent increase, with 271,000 visitors reported. They spent an estimated \$20 million.

Recreation vehicles constituted the majority of traffic. Bus tours showed a slight decrease but use of commercial transportation and facilities was generally up. Construction in the industry passed the \$2 million mark, most of it in Whitehorse.

The branch was charged with planning a territorial parks system and six potential areas were reserved.

Excellent promotion resulted from Yukon's involvement with Klondike Festival activities in Seattle. In late 1972 a Klondike '73 Committee was formed to coordinate the Yukon's 75th anniversary events of 1973.

A museum grant program was introduced, resulting in the start of construction of one new museum.

Several writers, film crews and travel agents were hosted, and a familiarization tour was conducted for several Canadian Government Travel Bureau representatives.

Yukon House in Vancouver expanded its tourist promotion and general information services, particularly in the areas of media relations and business inquiries.

Tourist information centres were open throughout the summer at Watson Lake, Beaver Creek, Haines Junction and Dawson City in the Yukon and at Prince George and Dawson Creek in British Columbia.

Information services expanded considerably by extending service to cover all departments. The photo section also improved, particularly in the area of establishing an adequate photo library.

Plans for 1973

- to display a travel exhibit at major sports and travel shows in Anaheim, San Francisco and Toronto
- establish community grants for Klondike '73 events
- develop plans for Territorial parks
- undertake research projects on tourist development
- expand involvement with the industry within the Territory
- continued development of photo and information sections

DEPARTMENT OF TREASURY

Responsibilities

- Management of the Yukon Consolidated Revenue Fund.
- Collection of all taxes and revenues.
- Supervision, control and direction of all matters related to the financial affairs of the Territory.
- Data centre for all government departments.
- Central purchasing and central stores.

Long-term Plans

- Continued improvement of financial management techniques and introduction of combined financial and operational management reporting.
- Conversion of data processing system from card system to disk system.

Review of 1971 Operations

Operation and maintenance expenditures for the fiscal year ending 31 March 1972 increased to \$18,883,948 from \$16,098,612 for the previous fiscal year. This increase is attributable to higher wages, increased student enrollment in the education system and to increased costs under the statutory health and welfare programs.

Revenue, recoveries and operating deficit grant related to operation and maintenance increased to \$20,202,875 for the period ending 31 March 1972 from \$14,897,635 for the previous fiscal year. Increases in this area resulted from imposed tax increases, normal volume increases, higher recoveries as a result of higher expenditures and a substantially higher deficit grant.

Project and loan capital

Capital and Loan expenditures for the fiscal year ending 31 March 1972 amounted to \$5,075, 510 of which \$1,871,112 was financed through cost-sharing agreements, with the balance being funded by way of loans from the federal government.

Plans for 1973

Financial planning for 1973 has been completed and expectations are for a well-planned and controlled operation. Data processing planning is under way in the education and welfare departments to provide statistical data and other clerical saving reports. Central purchasing and stores will introduce a new purchasing system in early 1973 to improve government operations and reduce costs of both administering this function and material costs.

NATIONAL ENERGY BOARD (NEB)

Responsibilities

Under Part III of the National Energy Board Act, no extra-provincial or inter-provincial pipeline may be constructed or operated without the approval of the National Energy Board.

Pipelines in the North built to move oil or to markets outside the territories will be regulated by the National Energy Board.

The board's responsibilities also relate to protection of property and the safety of the public and of the company's employees in the operation of a pipeline.

Under Part VI of the National Energy Board Act, any oil or gas produced in the North for export from Canada must have the approval of the board.

Plans for 1973

It is anticipated that applications for certificates of public convenience and necessity for a northern pipeline, and licences for the import and export of gas from the North will be filed with the board during 1973.

Studies related to the design, construction, operation, maintenance and safety of pipelines will continue, along with the development of procedures for the hearing of applications to build pipelines.

Studies related to the estimation of reserves of oil and gas in the North will continue.

Review of 1972 Operations

The board has been concerned with the special requirements for the design, construction and operation of pipelines in the North in respect to the protection of the environment and in setting safety regulations that will apply to pipelines under the board's jurisdiction.

Draft regulations have been discussed with interested federal government departments and with industry.

The board is considering various studies and is following research conducted by federal agencies, departments and industry.

The preliminary work of Mackenzie Valley Pipeline Research Limited was reviewed and will be reviewed.

Procedures for hearing applications to build pipelines in the North are under consideration by the board.

The board has continued its review of reserves of oil and gas in the North.

NATIONAL FILM BOARD (NFB)

Responsibilities

The production of motion pictures, film loops, film strips, slide sets and still photo exhibits about the Canadian North, its people and their activities, its industries, resources, and institutions; the distribution of these materials in Canada and abroad; and the distribution in the North of such material interpreting Canada and exploring issues of national interest; counsel to federal government agencies concerning the application of audio-visual media and the planning, production and distribution of departmental films for information, instruction, training and cultural purposes.

Long-Term Plans

Normal planning to meet responsibilities.

Review of 1972 Operations

Staff

No full-time or part-time NFB staff reside in the North. Film crew, trainers, and distribution representatives travel north on assignment.

Film Production

The Board produced for its own program *28 Degrees Above and Below* and *Cry of the Wild*.

These foreign versions were completed during the year: *In One Day* in Japanese, Portuguese and Spanish; *Nahanni* and *Eskimo Artist* — *Kenojuak* in Bengali and Urdu; *Angottee* and *Manhattan Odyssey* in Thai and Spanish respectively.

Le Caribou des Toundras was made for the Department of the Environment. The Department of National Health and Welfare sponsored *The Second Arctic Winter Games*, a film conceived and produced by the NFB

film unit and directed and staffed by Indians, a unit which, moreover, trains other Indians in film production. *James Bay Tractor Train* and *Moosonee Tractor Train* were produced for the Department of Indian Affairs and Northern Development.

In co-operation with the National Film Board Indian and Northern Affairs continued to enlist the help of Eskimo artists in making animated films of Eskimo legends. 1972 saw the completion of *The Owl and The Raven*, the film being produced in English, French and Eskimo.

Distribution

The board's westernmost distribution region combines British Columbia and the Yukon. NFB film services in the Yukon are provided through the Whitehorse Public Library, which has a film section, and also borrows from the NFB regional office in Vancouver.

The remainder of northern Canada continued to be served by the Outpost Film Library in the NFB Ottawa regional office.

Advice and organizational help in the Mackenzie District is provided by the board's representative in Edmonton, who makes two trips annually to the North.

Challenge for Change

At the invitation of the Northwest Territories Council an NFB representative went to Frobisher Bay to act as consultant on adult education; similarly, at the invitation of the Department of Communications, an NFB representative acted as consultant for the Northern Pilot Project at Baker Lake.

Plans for 1973

The National Film Board will complete in 1973 a feature length film called *Cold Journey*. NFB further plans to make a film on

Inuit sculpture (*Masterworks*), an environmental study of an important whale species (*Bowhead Whale*) and a one-hour film on the Yukon. Under the Challenge for Change program, NFB will be further involved in filming *Cree Family* in the James Bay area.

The Department of Indian Affairs and Northern Development will continue to collaborate with NFB in using Eskimo artists trained in animation techniques, to make films of Eskimo legends. *The Owl and The Goose* will be completed; likewise two film strips: *The Owl and The Lemming* and *The Owl and The Raven*.

The NFB will also co-produce with the same department *Pictures Out of My Life* recollections and drawings of the Eskimo artist Petseolak. A film *Nahanni National Park* is also planned for the Department of Regional Economic Expansion. Further National Museums of Canada will sponsor *Arctic Tundra*.

Distribution

The NFB intends to transfer the Outpost Film Library from its present location in Ottawa to Edmonton, Alberta. The change will make films more accessible to users of the network of film libraries in the North.

NATIONAL MUSEUMS OF CANADA (NMC)

NATIONAL MUSEUM OF MAN

Three divisions of the National Museum of Man, Archaeological Survey of Canada, Ethnology, and Communications, conducted activities in the Canadian North in 1972.

Archaeological Survey of Canada

Responsibilities

To conduct archaeological research on the prehistory of the native peoples of Canada, including those in the Yukon Territory and the Northwest Territories, and to make findings known to the public.

Long-term Plans

To locate and excavate archaeological sites in the Yukon and Northwest Territories, and to compile and analyze the information recovered so as to trace the origins and development of the native cultures of the North. Further, to co-operate with other federal or Territorial agencies concerned with the dissemination of this information.

Review of 1972 Operations

The officer of the Archaeological Survey of Canada conducted research in the North:

Dr. Donald W. Clark carried out an archaeological survey of the northern and eastern shores of Great Bear Lake. There were six projects under the archaeological salvage contract of the Archaeological Survey of Canada:

In co-operation with Indian and Northern Affairs, Mr. Jacques Cinq-Mars, Ottawa, assisted by Dr. J.F.V. Millar, University of Saskatchewan, and Mr. B.C. Gordon, University of Calgary, undertook a preliminary study of the Mackenzie Pipeline Corridor.

Mr. M.S. Gates, University of Calgary, was engaged in a survey of the area of the Aishihik Power Project, Yukon Territory.

Mr. T.C. Losey, University of Alberta, initiated a survey of the Mackenzie Highway, in co-operation with the Department of Indian and Northern Affairs.

Dr. J.F.V. Millar, University of Saskatchewan, continued with survey work in the Fisherman Lake area.

Fr. Guy Mary-Rousselière, Pond Inlet, N.W.T., conducted salvage work at the Button Point site, which is gradually being eroded by wave action.

Mr. Peter Schedermann, University of Calgary, carried out salvage work at Cumberland Sound and on Broughton Island, N.W.T.

Dr. Roscoe Wilmeth became a member of the Environmental Working Group, Mackenzie Highway Sub-Committee.

Plans for 1973

Increasing development in the North ensures a concomitant increase in the National Museum of Man's salvage program in that area.

Ethnology Division

Responsibilities

To document the cultural heritage of the native peoples of Canada, including research, material collection, and analysis and dissemination of information on the social, linguistic and material culture of the Indians and Inuit of the Yukon Territory and the Northwest Territories.

Long-term Plans

To conduct field and archival research on the cultures of northern indigenous peoples. Staff members direct the work, but much of

it is done under contract by outside personnel. One aim is to involve greater numbers of Indian and Inuit people in the documentation of their own cultural heritage so they can then use the material to teach their own cultural history.

Review of 1972 Operations

Inuit Research

Staff ethnologist David W. Zimmerman directed a film crew in Broughton Island, N.W.T. A 23-minute color, sound film titled *Qiqirtarjuamiut Udlumi* (Broughton Island Eskimo Today) was completed, and footage was gathered on the reconstruction of a kayak.

The following studies were made by outside workers under contract:

- Research on the traditional religion of the Iglulik Inuit — Dr. Bernard Saladin d'Anglure.
- Research on the traditional clothing technology of the Iglulik Inuit — Sylvie Pharand.
- Study of the folk taxonomy of plants and animals among the Inuit of Baker Lake, N.W.T. — Dr. Jeanpierre R. Paillet.
- Analysis of population maintenance, settlement patterns and adaptive strategies for the Inuit of Southeast Baffin Island — William B. Kemp.
- Continued comparative study of emotion concepts and behaviour of the Utkuhikhalingmiut — Dr. Jean Briggs.
- Documentation of early Inuit films in the collections of the National Museum of Man — Richard S. Finnie.

Athabaskan Research

Staff ethnologist A. McFadyen Clark continued research on social organization, settlement pattern and oral tradition of the Koyukon Athabaskan; and staff ethnologist C. Davis continued research on Chilcotin and Carrier linguistics and oral tradition. Additional research was conducted by contract anthropologists, as follows:

- Initiation of an in-depth study of language and oral tradition of the Kutchin in the Ft. McPherson region, N.W.T. — Dr. John Ritter.
- Initiation of a contact-traditional study of the Mountain Athabaskan at Ft. Norman, N.W.T. — Mrs. Beryl Gillespie.
- Continuation of a comprehensive investigation of oral tradition and language of the Algatcho Carrier and Chilcotin by a native speaker — Benny Jack.
- Research on Chilcotin language and oral tradition at Alexis Creek, Alexandria and Nemiah Valley — Dr. Evelyn Todd.

Plans for 1973

Inuit Research

Staff ethnologist David W. Zimmerley plans to do research and filming at the Inuit spring sealing camps in the Eastern Arctic.

The following projects are planned for completion by outside salvage contract personnel:

- Work on a grammar and dictionary of the Cumberland Peninsula Inuit, Baffin Island, N.W.T.
- Effects of acculturation on the Inuit Music of Cumberland Peninsula, Baffin Island, N.W.T.
- Effects of the Davis Strait Whale Fishery, 1817-1915, on the Inuit of the Eastern Arctic.
- Iglulik Inuit string figures and Pond Inlet kayak reconstruction.
- Social organization and oral traditions of the Caribou Inuit.
- Contemporary music of the Copper Inuit.
- Cultural ecology of the Inuit of Clyde River, N.W.T.

Athabaskan Research

Staff ethnologist A. McFadyen Clark will initiate a study of Tahltan material and social culture and continue working with the people at Atlin, B.C. and Teslin, Y.T. to assist them in collection of their oral tradition and development of a small museum of traditional material culture.

The following projects are planned for completion by outside salvage contract ethnologists:

- Collection of oral tradition and continuation of a linguistics study of Algatcho Carrier and Chilcotin by two contractees, one a native speaker, in the region between Ahahim Lake and Bella Coola, B.C.
- Continuation of collection of oral tradition and an in-depth analysis of Kutchin language in and about Ft. McPherson, N.W.T.
- Continuation of a study of contact-traditional sociopolitical organization and warfare among the Tagish, Inland Tlingit and Tutchone in the Yukon.
- Initiation of a contact-traditional study for the period 1880-1910 among the Northern Tutchone of the Yukon.
- Continuation of collection and processing of Athabaskan myth and legend from elderly patients in hospital in Saskatchewan, the Yukon Territory and the Northwest Territories.

Communications Division

Responsibilities

To extend national collections to Canadians through travelling and temporary exhibitions, Edukits, and school loans.

Long-term Plans

To make available a range of multi-media Edukits, slide programs, films and artifacts on northern Eskimo and Indian life for distribution to schools.

Review of 1972 Operations

The Territorial Education Branch has been circulating a special travelling exhibition prepared by the National Museum of Man for an exclusive tour in the Northwest Territories.

"Eskimo History"

With photographs, maps and artifacts this small exhibit gives some archaeological answers to such questions as: When did Eskimos first settle in Arctic Canada? Where did they come from? How did they learn to live here? Dr. Robert McGhee prepared the storyline and selected the materials for this exhibition from the museum's vast archaeological collections. The colourful table-top display cases were designed for easy handling and shipment and for exclusive initial showing in schools and small community centres

of the Northwest Territories. All text labels are written in Eskimo and English.

Schedule — Start in Yellowknife September 1971, then to Fort Providence, Hay River, Pine Point, Fort Smith, Edzo, Yellowknife, Coppermine, Cambridge Bay, Resolute, Frobisher Bay, Pangnirtung, Cape Dorset, Frobisher Bay, Churchill, Eskimo Point, Wharfedale Cove, Chesterfield Inlet, Rankin Inlet, Baker Lake, via Rankin Inlet, Repulse Bay, Coronation Harbour, Igloodik or Churchill.

Together with the director, National Museum of Man, and the director, Nova Scotia Museum, the chief, communications division has served on an ad hoc committee to advise the commissioner on the establishment of the Museum of the North. The chief has also served as consultant to the architect and on the first board for the selection of a director for the Museum of the North.

Plans for 1973

Continuation of 1972 activities. There are also tentative plans for distribution of the first Edukit on Eskimo life.

NATIONAL MUSEUM OF NATURAL SCIENCES

Botany Division

Responsibilities

The Botany Division of the National Museum of Natural Sciences has an overriding interest in botanical exploration and research in Canada's North. The National Herbarium contains important collections of plants made in the Arctic during the past century. From time to time members of scientific staff (curators and botanists on contract) carry out field studies in the North. In addition, botanists from other institutions, both in Canada and abroad, regularly deposit original or duplicate sets of specimens in the National Herbarium.

Long-term Plans

The Botany Division plans to continue a general program of exploration, research and publication on the Botany of Arctic Canada and to co-operate with other institutions and individuals working in the same area.

Review of 1972 Operations

National Herbarium

Dr. J.M. Gillett visited Rankin Inlet (62°49'N, 92°05'W) during the period 12-23 July 1972, in company with Terry Shum of Mosaic Films Ltd., Toronto. The purpose

the visit was to obtain film footage of arctic tundra which would later be used as part of a sequence on vegetation types across Canada. This film is to be used for museum display purposes as part of a diorama planned for the renovated Victoria Museum in Ottawa. Although filming was the primary purpose of the trip, an attempt was made to collect as many arctic plants as possible, using somewhat limited equipment, for the National Herbarium in Ottawa. Altogether 100 samples were made.

Dr. Gillett and Mr. Shaw left Ottawa on July 1, 1972 proceeding via Winnipeg to Churchill and to Rankin Inlet the next day. Accommodation at Rankin Inlet was arranged through the kindness of Professor J. Williamson, head of the Arctic Research and Training Centre, where excellent facilities were supplied at a nominal charge. Air transportation was also supplied by J. Williamson and all field work was carried out in the vicinity of Rankin Inlet until 15 July when the party returned to Ottawa by the same route.

The trip was highly successful as sufficient footage was obtained to complete the study without an additional flight to Baker Lake, as originally anticipated. The addition of the plant collection contributed substantially to the success of the trip.

Plans for 1973

National Herbarium

Dr. I.M. Brodo, Lichenology Section and Dr. R.R. Ireland, Bryology Section, plan to carry out general field work for the study collection of lichens and bryophytes on Bathurst Island, N.W.T. during the period 1 July 1973. The operation will be based at the National Museum of Canada's field station on Bathurst Island.

Dr. R.K.S. Lee, Phycology Section, plans to continue the marine algal survey to provide an inventory of what species occur in the Canadian Arctic and to determine where they occur and what relationship they have to each other and with the physical environment.

Canadian Oceanographic Identification Centre

Responsibilities

The Canadian Oceanographic Identification Centre provides identification services

of aquatic animals, and undertakes surveys of aquatic invertebrates in all oceans surrounding Canada as well as freshwater bodies of the country.

Long-term Plans

To continue the identification service and to study the aquatic fauna of the north in order to produce identification guides to different taxonomic groups of marine and freshwater invertebrates.

Review of 1972 Operations

The following projects were conducted:

- Identification service of arctic marine zooplankton.
- Taxonomic studies of arctic marine zooplankton collected by the C.O.I.C. staff.
- Field collection of freshwater invertebrates of Bathurst Island, N.W.T.

Plans for 1973

Plans are to continue identification services and to complete the study on zooplankton collection from the Arctic Ocean and freshwater collection from Bathurst Island.

Palaeontology Division

Fossil Vertebrates

Responsibilities

To undertake a reconnaissance of suitable areas in the Northwest Territories and the Yukon Territory for Cretaceous fossil vertebrates, in continuance of earlier collecting programs near Horton and Anderson rivers. To curate and describe Cretaceous vertebrate remains from the above regions.

Long-term Plans

Work will continue in the Canadian North, particularly the western Arctic islands, to gain an idea of the types of Cretaceous vertebrates that inhabited the region, so as to clarify knowledge of the environment there during Cretaceous time.

Review of 1972 Operations

During the summer, collections of marine Cretaceous vertebrates and sediment samples (for palaeoenvironmental analysis) were made in Banks and Eglinton islands, Northwest Territories. Field work was carried out in

conjunction with D.E. McAllister, Curator of Fishes and was supported by Polar Continental Shelf Project.

Plans for 1973

Plans include pursuance of co-operative field work in the vicinity of the Beaufort Sea, Northwest Territories with A.K. Rozdzhestvensky as part of a Canadian-Soviet exchange program. Particular effort will be made to study changes occurring at the Cretaceous-Tertiary boundary — the period when dinosaurs became extinct.

Quaternary Zoology

Responsibilities

To collect Pleistocene vertebrate material from the Yukon Territory and to describe and catalogue it in an attempt to reconstruct the vertebrate history of the region during the ice age.

Long-term Plans

To continue field work on Pleistocene vertebrates in the Yukon Territory, specifically in the vicinities of Dawson City and Old Crow River, until good representative collections have been established. Emphasis may be shifted later to the Yukon coast or Northwest Territories.

Review of 1972 Operations

From 7 to 12 July, Cretaceous-Tertiary sedimentary strata were examined between the mouths of Wind and Bonnet Plume rivers in the Yukon Territory. Fragments of a large dinosaur limb bone were collected near the mouth of Wind River, and Pleistocene vertebrates were also collected in the region. Support was provided by Dr. O.L. Hughes, Geological Survey of Canada.

During 9 to 29 August, a display "Ice Age Vertebrates of the Yukon" was organized and supervised in Dawson City, Y.T. The exhibit was of interest to local people and tourists who visited during "Discovery Day" celebrations, and served as an instructional exhibit for 40-geologists on an International Geological Congress field trip. Pleistocene fossils were collected near Dawson City also.

Plans for 1973

Plans for 1973 involve collection of Pleistocene vertebrate fossils along Old Crow River (1 July to 15 August). The 16 to 22 August will be spent collecting fossils in the vicinity of Dawson City.

Zoology Division

Ornithology Unit

Responsibilities

The Zoology Division of the National Museum of Natural Sciences is one of the primary contributors to the knowledge of animal species in Canada. Comprehensive faunal surveys are conducted and promoted, and the museum maintains important collections of the fauna and flora. Its scientific collections of arctic material are of special significance, and are among the best in the world. This division co-operates with other government agencies and scientists of other countries interested in understanding problems of the North.

The Ornithology Unit collects specimens and data on birds, primarily in Canada. It maintains a research collection of skins, eggs, and skeletons of birds, and an exhaustive bibliography on ornithology and files on the distribution of Canadian birds. It undertakes field studies, primarily bird surveys, in various parts of the country. The data and specimens are used in various studies, notably in taxonomy, systematics, zoogeography, ecology, and evolutionary biology. Results are published as scientific papers but the unit also promotes education and public interest in birds by the publication of semi-technical articles and books.

Long-term Plans

As part of a long-range study on the ecological distribution of the birds of Quebec and Labrador, field investigations have been undertaken in several southern sectors of that area. Data are still lacking from a number of key northern areas, notably the northernmost part of the Labrador coast, the eastern coast of Ungava Bay and adjacent island areas, the interior of the Ungava Peninsula (Payne Peninsula), and many coastal islands. All these distributional and ecological data, along with new taxonomic information and results on other aspects of bird biology will be incorporated in a comprehensive study on the birds of Quebec and Labrador.

Review of 1972 Operations

- Bird survey in southern part of James Bay basin, Quebec (June and July 1972): data (zoogeographical and ecological) and specimens were collected at three localities (near Matagami, Lac du Tass, and Cabbage Willows Bay) which are likely to

be affected should the planned hydro-electric development go ahead as expected. New distributional information was obtained on a number of bird species.

- Pterylosis studies on birds of arctic and subarctic regions: a number of specimens were preserved for further studies.
- Food habits of birds of boreal forest and arctic regions: specimens and observations were collected for further analysis.

Plans for 1973

As pointed out above, the eastern coast of Ungava Bay and adjacent inland areas are ornithologically poorly known. Plans are being made to undertake field investigations in the Koroc River valley and Ablovic Fjord during the summer of 1973.

The following projects will be continued in 1973:

- Pterylosis studies on birds of arctic and subarctic regions.
- Food habits of birds of boreal forest and arctic regions.

Ichthyology Unit

Responsibilities

Studying the taxonomy, distribution and ecology of fishes of Canada and the world, and building and maintaining a representative collection, disseminating knowledge by means of publications and displays.

Long-term Plans

Obtaining adequate arctic collections with ecological data. From this, research and review of the literature, publication of a monograph, "Marine Fishes of Arctic Canada".

Review of 1972 Operations

Don E. McAllister and Dale Russell of the National Museum of Natural Sciences with the logistic support of the Polar Continental Shelf Project (PCSP) made a biological survey of the fishes (and dinosaur fossils) in western Arctic Canada, including the Mackenzie District coast, Banks and Prince Patrick Islands, from 27 July to 6 August 1972. In their work they were assisted by Frank Hunt, field manager of the project,

Don F. Macdonald and Lauchie Currie, pilot and mechanic respectively of the Dominion Helicopters Ltd. Bell 205A helicopter.

The museum supplied collecting and preserving gear and the return fare Ottawa-Tuktoyaktuk. Room, board, helicopter, inflatable boat and some field gear were supplied by PCSP.

Fish specimens were collected using seagill net, angling, and a small otter trawl towed by an outboard-driven inflatable motor. Specimens were photographed live in aquaria. Observations, specimen and habitat photos were taken under water using SCUBA gear and wet suit. Ecological data on the fishes were recorded. Also collected were lichens, algae, invertebrates and fossils.

Sixteen species and 157 specimens of freshwater and marine fishes were collected from 15 stations. The more notable ichthyological results are as follows. The specimens of the pond smelt, *Hypomesus olidus*, are the first from brackish water in the Arctic; all other arctic records are from fresh water (McPhail and Lindsey, 1970). The known ranges of the arctic char, *Salvelinus alpinus*, the lake char, *S. namaycush*, and the nine-spine stickleback, *Pungitius pungitius*, on Banks Island have been extended; these samples will help judge whether Banks Island acted as a fish refugium during the Wisconsin. The specimens of the two-horn sculpin, *Ictalurus bicornis*, and the ribbed sculpin, *Tiglops pingelii*, are the first to be reported from Banks Island. The *Alaria* marine algae specimens photographed at Cape Parry comprise the first record of these algae from the western Canadian Arctic (Dr. R. Lee, lit.).

Fish collections from the Mackenzie District of the Northwest Territories were identified for the Department of the Environment during this period.

Plans for 1973

A survey of fishes of the little-known Boothia region may be undertaken in August with the support of the Arctic Unit of the Fisheries Research Board of Canada; museum funds being insufficient. Collections would be made and ecological information recorded along with photographs of fishes under water and live in aquaria.

Vertebrate Ethology Section

Responsibilities

The Vertebrate Ethology Section is undertaking detailed, long-term studies at Bathurst Island, N.W.T. These are intended

demonstrate the important interrelationships that exist between species of arctic animals and the behavioural adaptations that enable them to survive in High Arctic environments. This small field station provides opportunities for university students to undertake research problems, and promotes public interest and education in the High Arctic.

Long-term Plans

Collaboration with the Polar Continental Shelf Project made it possible to establish a research program at Bathurst Island in 1968. With their continued support the station has become well established and prolific of new data. This research program deals with communities and densities of species, and factors affecting them and can only achieve full values and objectives if it can be maintained for at least ten years. Continuous records of phenological events during day-length are essential. Ten years is considered minimum time for interspecific relationships, adaptations to population fluctuations of prey species, and the weather conditions affecting them to become apparent. The present plan is to continue the established research program at least until 1978. This program emphasizes the study of arctic animals in their undisturbed natural environment, and the research area is now being considered as a possible preserve by the Tundra Panel of the International Biological Program.

Review of 1972 Operations

Ethology of Rock Ptarmigan. Limited field work was done due to an extremely small population and adverse weather conditions.

Ethology of the Ivory Gull. A survey was made of a nesting colony in preparation for a detailed study of this species.

Life history and ecology of the Varying Lemming. Data on rate of population increase and habitat preference were obtained.

Ecology of King Eider. This study produced additional information on the extent of predation on eider nests by arctic foxes. Some determining factors were discovered in the selection of nest sites by eiders.

- Biological Survey of Hans Island. The survey produced new data on the avifauna. In addition, a representative botanical collection of plants, mosses, and lichens was acquired.
- Radio-location telemetry. A preliminary study of basic systems and components was completed.
- Ethology and annual cycle of the Sanderling. Observations were made on nesting behaviour utilizing birds that had been banded.
- Ethology of Black-bellied Plover. Extensive field data were obtained on the nesting behaviour of this species.
- Botanical study of Sedge Meadows. The initial part of this study has begun with the establishment of several plots in the area.
- Surface Meteorology. Observations were taken twice daily during the four-month field season, while maintaining a record of phenological events in order to determine the effect of weather upon the populations studied.

Plans for 1973

The projects as outlined above for 1972 are to continue except for the following:

- Ecology of King Eider. Thesis for Msc in preparation.
- Biological Survey of Hans Island. Field work completed and data are being analyzed.

Should the size of the populations warrant it, two projects which were inactive in 1972 will be reactivated.
- Life history and ecology of Red Phalarope.
- Behaviour and life history of Arctic Hares.

NATIONAL RESEARCH COUNCIL OF CANADA (NRC)

Responsibilities

Investigations into various phases of pure and applied sciences in northern Canada.

Long-term Plans

Several divisions of the National Research Council have a continuing interest in the North.

The Division of Physics is involved in studies of space radiation from stations in northern Canada; these studies include ground-based cosmic ray observations and rocket measurements of charged particles in the earth's magnetosphere.

The Division of Building Research conducts studies of permafrost, snow and ice and building problems in the North.

The Radio and Electrical Engineering division carries out radio and optical measurements of upper atmospheric phenomena, for example, observations of aurora and airglow. These observations are made both from ground bases and with rockets.

The Space Research Facilities Branch operates the Churchill Research Range, the Great Whale Geophysical Station, a launching facility at Resolute Bay, and co-ordinates scientific programs conducted at these and other locations in Canada.

Other divisions of the National Research Council become involved periodically in northern work on a short-term basis. For example, the Ship and Marine Dynamics Laboratory of the Division of Mechanical Engineering is concerned with the design and development of ice breakers and the general ice environment as it affects shipping in the North. This laboratory has been extending knowledge of the resistance of ships in ice to the design considerations of installed power and has been providing consulting advice on this subject.

Review of 1972 Operations

Division of Physics

Continuous monitoring of cosmic ray intensities was carried out at five stations in northern Canada (Resolute, Churchill, Alert, Inuvik and Goose Bay). This work is part of an international program based on a network of cosmic ray stations and has been carried out in collaboration with Atomic Energy of Canada Limited, Chalk River, and the Southwest Center for Advanced Studies, Dallas, Texas. As the result of a review of the cosmic ray monitoring program which was completed in 1972, some reorganization of the stations is being done. To date the station at Resolute Bay has been closed down and plans are under way for the Physics Division of N.R.C. to take over complete operation of the stations at Alert, Inuvik and Goose Bay.

During 1972 a number of experiments were flown on rockets from Fort Churchill in a continuing study of the charged particles responsible for aurora and other geophysical effects. New results have been obtained on the composition of ions entering the atmosphere at high latitudes and on the nature of D.C. electric fields in the high latitude ionosphere.

Division of Building Research

The division continued to operate a small field station at Thompson to provide support for various engineering and terrain studies of permafrost being carried out in northern Manitoba. A special test site was selected and prepared at Thompson during 1972 and nine steel piles and instrumentation installed as the first stage of a program to measure frost heave forces on foundations. Observations were begun in October. A study begun in 1971 to determine the

influence of heat conduction along foundations on the ground thermal regime was continued. In co-operation with Manitoba Hydro, studies of previous dykes constructed on thawing permafrost were carried out at the Kelsey and Kettle generating stations on the Nelson River. In a co-operative study with the Department of Public Works, group temperature observations along a buried water supply line were continued at Churchill. Investigations of microclimate and terrain factors influencing the distribution of permafrost were continued at several Thompson test sites.

As part of the long-term studies on the distribution of permafrost in Canada, ground temperature measurements were continued at eight locations near Yellowknife, N.W.T. at 12 sites on mountain summits in British Columbia, and at 12 sites on Devon Island in the Arctic archipelago. Four ground temperature cables were installed at Rankin Inlet.

In 1972 the division, participating with the departments of Indian and Northern Affairs, Public Works, and Transport, designed and supervised the construction of several instrumented, insulated road test sections on the Mackenzie Highway, just south of Inuvik, N.W.T. The study was designed to evaluate the use of insulation in gravel fills as a construction technique to prevent thawing of underlying permafrost. Observations begun some years ago to assess the long-term performance of various structures on permafrost at Inuvik, including the airstrip and buildings supported by piles and duct-ventilated gravel pads, were continued.

Development of equipment and procedures for determining the thaw settlement characteristics and thermal properties of permafrost was continued. In co-operation with Mackenzie Valley Pipeline Research

limited a program of field and laboratory studies to measure the thermal conductivity of frozen and thawed soils from test sites at Inuvik was completed utilizing a cylindrical tube and equipment developed by the division. These are part of an overall program of studies on problems associated with the construction of oil and gas pipelines in northern Canada.

Attention is being given to determining the maximum force that ice can exert on structures. Devices for measuring in situ stresses and strains in ice covers were successfully tested in the field. Measurements are being made of uplift forces exerted by ice on piles due to a change in water level. A laboratory study was made of the strain rate dependence of Young's modulus of various types of ice.

The U.S.S.R. ice pressure code was translated by N.R.C. and is to be published in its Technical Translation Series.

Advice and assistance was given on a number of northern building and geotechnical problems brought to the division by various engineering firms and federal and provincial departments and agencies.

Radio and Electrical Engineering Division
In January spectrometric and photographic observations of auroral and airglow emissions in the visible and infrared regions were made from the auroral observatory at Churchill and from Gillam, Manitoba. Data obtained are being correlated with observations made by photometers on board the ISIS II spacecraft.

Auroral radar equipment was operated continuously at Poste-de-la-Baleine (Great Whale River), P.Q., and at Churchill and Thompson, Manitoba.

During 1972 plasma probes were flown on six auroral rockets launched at Churchill. Auroral photometers were flown on two rockets. These flights were supported by ground-based photometric observations. A total solar eclipse occurred on July 10, and specially instrumented rockets were flown on that day. Micrometeoroid detectors were placed on rockets fired from Churchill.

During 1972, DA-3 auroral all-sky cameras were in operation at Poste-de-la-Baleine, P.Q., Moosonee, Ontario, and Churchill, Manitoba.

Space Research Facilities Branch
NRC through its Space Research Facilities Branch continued to operate the Churchill Research Range (CRR) during 1972. Programs included the launching of

scientific sounding rockets and balloons to investigate geophysical phenomena in the upper atmosphere on behalf of scientists from Canada, the United States and other countries. Associated ground-based experiments were also carried out by scientists from various universities participating in these programs.

The branch was also responsible for co-ordinating various co-operative scientific programs at the Great Whale Geophysical Station. During 1972 arrangements were made to install and operate VLF/LF equipment for the Communications Research Centre of the Department of Communications, Ottawa, and the taking over of the operation of the magnetic observatory for the Department of Energy, Mines and Resources, Ottawa.

Early in 1972 a special series of four scientific sounding rockets to make measurements over as wide a latitude as possible were launched from Churchill in conjunction with one from Gillam, Manitoba. A further four rockets were launched from the CRR on 10 July into the eclipse of the sun.

National Aeronautical Establishment

At the request of the Department of Energy, Mines and Resources aeromagnetic surveys were made in Davis Strait and Baffin Bay between latitudes 62°N and 72°N. They supplemented surveys carried out in 1964, 1966 and 1967 to determine the orientation and magnitude of magnetic anomalies occurring in those areas and to see what evidence they provide to substantiate the theory of continental drift.

Plans for 1973

Division of Physics

It is planned to continue both the cosmic ray monitoring program and the rocket program in 1973. It is likely that further changes will be made in the cosmic ray monitoring program. Under discussion at present is the possible closing down of the station at Goose Bay and the withdrawal of the Southwest Center for Advanced Studies from their participation in the Churchill station. The rocket program will probably be maintained at about the same level as in 1972.

Division of Building Research

Surveys of the distribution of permafrost will be continued at Yellowknife, Devon Island, Rankin Inlet and in the mountains of British Columbia. Ground temperature cables will be installed at Churchill. The

micro-climate and terrain studies of permafrost will be carried on at Thompson.

Additional instrumentation will be installed and the study of insulated roadways on permafrost continued at Inuvik in co-operation with the Departments of Indian and Northern Affairs, Public Works, and Transport. The study of frost heave forces on foundations at Thompson will be expanded with the installation of wood and concrete piles.

Studies of the performance on engineering structures and facilities in permafrost will be continued at Inuvik, N.W.T. and Thompson and Gillam, Manitoba. Equipment development and field and laboratory investigations into the stability and settlement characteristics and the thermal properties of frozen and thawing soils will be carried out. Further co-operative studies with the petroleum industry of geotechnical problems associated with the construction and operation of pipelines in permafrost areas are anticipated.

Opportunities are being sought to measure in situ stresses and strains in ice covers at sites where significant pressures occur. Investigations are to be continued on uplift forces exerted by ice on piles due to change in water level. Consideration is being given to a laboratory study of edge-loading of ice plates to establish the dependence of maximum load on the ratio of the width of the loading surface to the thickness of the ice.

Radio and Electrical Engineering Division

Instrumental equipment to observe aurora and airglow will continue to be used routinely at Poste-de-la-Baleine, Churchill, Thompson and Moosonee. Observations of aurora and airglow in the ultraviolet, visible, and infrared regions of the spectrum will be made during selected periods of the winter of 1973/74 from the Auroral Observatory at Fort Churchill and from Gillam, Manitoba.

The network of auroral radars, including Churchill, Thompson, and Great Whale, will continue to operate.

Upper atmosphere rocket experiments will be launched from Churchill and from Gillam. These rockets will carry plasma probes, photometers, and micrometeoroid detectors.

Space Research Facilities Branch

The Churchill Research Range will continue to launch scientific sounding rockets and balloons to investigate geophysical phenomena in the Earth's atmosphere and in

space on behalf of scientists from Canada, the United States and other countries. Early in 1973 a special series of four Canadian scientific rockets and two NASA rockets will be launched from CRR, including one from Gillam, Manitoba, to investigate the expansive phase of a single auroral sub-storm. These launchings are a repeat of the ones conducted in early 1972 from Gillam and the CRR.

The Great Whale Geophysical Station will continue the work of auroral photography and photometry and making a variety of radio frequency measurements for Canadian and U.S. agencies. Facilities at Great Whale will be used to supplement those at CRR in conjunction with rocket and balloon-borne experiments. The Office of Naval Research (ONR) propose to launch up to four scientific balloons from Great Whale as part of their annual "Skyhook" program conducted at the CRR and other locations in Canada. These flights will be coordinated by SRFB on behalf of ONR.

National Aeronautical Establishment

The aeromagnetic surveys in Davis Strait and Baffin Bay will be continued during the spring of 1973 for the Department of Energy, Mines and Resources.

NORTHERN CANADA POWER COMMISSION (NCPCC)

Responsibilities

To provide public utilities in the Yukon and Northwest Territories as authorized by the Government-in-Council. To operate each plant from consumer revenue on a self-maintaining basis including repayment of capital expenditures.

Long-term Plans

Forecast and normal planning in order to establish, maintain, and expand electrical utility requirements.

Review of 1972 Operations

Gross generation of electrical energy during the year approximated 500 million kWh. Approximately 83 per cent was generated by hydro-electric plants at Whitehorse, Mayo in the Yukon and Snare River and Inuvik plants in the Northwest Territories. During 1972 Northern Canada Power Commission assumed responsibility from the Government of the Northwest Territories for the operation of 14 plants in the Northwest Territories: Arctic Red River, Coral Harbour, Repulse Bay, Pangnirtung, Gjoa Haven, Spence Bay, Holman, Cape Dorset, Baffin Bay, Broughton Island, Lake Harbour, Repulse Bay, Igloodik and Hall Beach. In order to meet increased load, additional diesel-electric generating capacity was added at Fort Simpson, Fort McPherson, Inuvik, Norman Wells, Tuktoyaktuk, Repulse Bay, Pangnirtung, Holman, Whale Bay, Eskimo Point, Cape Dorset, Broughton Island, and Igloodik.

A 90 million BTU/hour high-temperature, high-pressure water generator was added to the Inuvik, NWT heating plant to meet the increased heating load developing in the winter.

A 80-mile, three-phase, 69,000-volt, wood-pole transmission line was constructed between Inuvik and Tuktoyaktuk in the Northwest Territories.

Several possible hydro power sites in the Yukon and the Northwest Territories were investigated. In the Yukon an application was made for a licence to develop hydro power facilities on the Aishihik River. The proposed development would be connected by transmission line to the existing Whitehorse-Faro transmission system.

Plans for 1973

To ensure optimum service investigations, planning and reviews of existing operations will proceed.

Plans have been made to take over eight additional plants being operated by the Government of the Northwest Territories. They are located in Fort Liard, Wrigley, Jean Marie River, Nahanni Butte, Lac La Martre, Port Burwell, Clyde and Paulatuk.

During the summer of 1973 the commission head office will be moved from Ottawa to Edmonton. This will improve communications with our regional offices, Territorial governments in Whitehorse and Yellowknife as well as with suppliers and major customers.

NORTHERN TRANSPORTATION COMPANY LIMITED (NTCL)

Responsibilities

Northern Transportation Company Limited has operated throughout the Mackenzie River system and the western Arctic coast for over 40 years. The company's marine operations have been the principal transportation serving general community freighting needs and providing logistic support for oil, gas and mineral exploration and development. Since 1944 N.T.C.L. has transported approximately 4 million tons of freight over its 4,800 mile system. The company operates a fleet of three ocean-going ships, 28 diesel tugs and 145 all-steel, dual-purpose barges with capacities of up to 1,500 tons, providing an aggregate gross tonnage of 58,000 tons. During the normal May to October navigational season N.T.C.L. employs more than 800 persons, many of whom are residents of the region it serves.

Long-term Plans

As the sole marine common carrier operating throughout the entire Mackenzie system, N.T.C.L. must have adequate equipment and facilities to discharge its responsibility to community and industrial customers. The company has, accordingly, embarked on a substantial capital expansion program which is expected to continue for some years.

Review of 1972 Operations

In 1972 N.T.C.L. completed the most successful year in its history. Despite adverse Arctic weather, regarded by many as the worst in 50 years, and the loss of one week of shipping at the outset, supply operations were successfully completed before freeze-up. This achievement, however, necessitated continuous operation at fleet capacity.

Largely due to the substantial increase in oil industry drilling and exploration, total traffic handled (283,321 tons in 1971) rose in 1972 to a record 398,641 tons of cargo, an increase of over 40 per cent. More significant, however, since it is a more accurate indicator of the unprecedented volume of cargo delivered, was the 88 per cent increase in ton-miles. The larger volume of traffic was reflected in the earnings of the company. On aggregate revenue of \$15,849,267 (compared to \$7,754,107 in 1971), N.T.C.L. recorded a net profit, after taxes, of \$1,955,233 (compared to a net loss of \$1,221,820 in 1971).

Throughout 1972 the company sought to improve both the quality and frequency of its service. To this end, a limited number of ISO containers were introduced for the first time, and plans were completed for greater use of container shipping along with the introduction of an intermodal service between Alberta and the larger northern centres. During 1972 N.T.C.L. continued to place considerable emphasis on improving equipment utilization and efficiency with encouraging results. In addition to modifying its econometric forecasting model, which is being used for corporate planning, work has also begun on a computer freight control model.

In the summer of 1972 N.T.C.L. began, under contract, to operate a Bell Aerospace Canada "Voyageur" 25-ton payload flat-deck, amphibious air cushion vehicle for its owner, the Ministry of Transport. Evaluation of the craft will extend into the third quarter of 1973. The "Voyageur" represents a new generation of rugged heavy-haul freighter ACVs, and the beginning of a new Canadian manufacturing industry. As the sole commercial operator of the craft during evaluation, N.T.C.L. is looking for long-term

commercial applications, particularly in the Mackenzie delta.

Plans for 1973

N.T.C.L. now finds itself at an operational cross-roads. The region it serves is clearly entering a period of dynamic and sustained economic growth. The discovery of major hydrocarbon deposits, with the prospect of even greater reserves, is the basis for anticipating this growth. In the immediate context the primary factor is the probable construction of a \$5,000-million large-diameter, natural gas pipeline the route of which will probably parallel the Mackenzie River over a considerable part of its course. Aside from the freighting demands which pipeline construction itself generate directly, the effect, as evidence of the growth of a greatly expanded community and industrial infrastructure, will without question result in transportation demands the magnitude of which cannot be adequately envisaged.

N.T.C.L. has a capital budget of \$35 million for 1973, most of which will be spent on enlarging the company's marine fleet. Among the equipment to be added are four 4,500 h.p. mainliner tugs, a 2,000 h.p. yarding tug, and twenty 1,500-ton barges. Management also plans to continue increasing and improving shore installations to purchase additional ISO containers and acquire several air cushion vehicles and a trucking company. In addition, the expansion program provides for the development of facilities at certain agencies, including staff accommodation, in keeping with the requirement to offer expediting and warehousing services on a year-round basis employing local contractors wherever possible. A requirement for new mobile and materials handling equipment arises out

the need, based on traffic projections, to replace or upgrade as well as add to equipment.

N.T.C.L. will continue to press for the initiation of an accelerated program of Mackenzie River dredging and channel improvement. The company is convinced that this approach will prove to be far more economic in achieving the needed increase in marine freighting capacity than will the mere acquisition of additional marine equipment.

POST OFFICE DEPARTMENT (PO)

Responsibilities

Provision of mail service to and from post offices in the Yukon Territory and the Northwest Territories.

Long-term Plans

To provide, at an equitable cost, adequate mail service, subject to the availability of transportation services.

Review of 1972 Operations

Transportation expenditures

	Yukon	NWT
within the Territories	\$110,815.19	\$ 265,323.82
to and from the Territories	730,318.05	1,767,910.88
Total	\$841,133.24	\$2,033,234.70

Salaries and other expenditures

Yukon Territory	\$387,706
Northwest Territories	332,039

Revenues

Yukon Territory	\$354,430
Northwest Territories	332,732

Plans for 1973

To continue to provide adequate postal service commensurate with cost.

ROYAL CANADIAN MOUNTED POLICE (RCMP)

Responsibilities

The Royal Canadian Mounted Police has the entire responsibility for policing the Yukon Territory and the Northwest Territories, to prevent and investigate crime in an endeavour to maintain law and order and to strive for a peaceful society in the North. The force is responsible for enforcing federal statutes and Territorial laws, as well as some municipal by-laws in the communities of Whitehorse, Dawson, Yellowknife, Hay River, Fort Smith and Inuvik.

Long-term Plans

Due to greater activity and population growth in northern communities, long-term plans are continually under review for additional detachments and manpower to meet the demands for increased police protection. Members are being continually trained in new techniques to cope with the elements of sophisticated crime.

Review of 1972 Operations

Norman Wells, NWT, formerly a summer detachment, was opened as a year-round detachment.

A warehouse/workshop/garage complex was completed at Fort McPherson.

Plans for 1973

Completion of married quarters, warehouse, workshop, and garage at Norman Wells during the summer.

New married quarters for Liard and Fort Providence to be completed.

New cell cabin for Fort Simpson, and renovations to offices of detachment quarters.

Addition of new administration wing to Yellowknife sub-division headquarters.

- construction of new single quarters and cell block at Fort Smith detachment.
- construction of detachment married quarters at Coppermine.

STATISTICS CANADA (SC)

AGRICULTURE DIVISION

Responsibilities

To publish statistics on wildlife pelts.

Long-term Plans

No change is contemplated.

Review of 1972 Operations

Fur Production — Data were obtained on the numbers and values of pelts taken. The number of pelts bought from trappers and the prices paid were provided by the Government of the Northwest Territories. The number of pelts exported from the Yukon and the prices paid to trappers were provided by the Government of the Yukon Territory.

Plans for 1973

Same as 1972.

EDUCATION DIVISION

Responsibilities

To publish statistics on pupils in elementary and secondary schools by age, grade and sex as well as data on secondary school graduates, pupil withdrawals and an attendance summary

Long-term Plans

To link the territorial schools into a national enrolment collection system that can be combined with teacher, school facilities, census and other relevant data.

Review of 1972 Operations

Data were collected on enrolment and pupil withdrawals.

Plans for 1973

Statistics will be collected on enrolment and improvements are planned in the survey of pupil withdrawal.

GOVERNMENTS DIVISION

Responsibilities

To publish statistics on the financial operations of all levels of government in Canada.

Long-term Plans

To publish data on quarterly revenue and expenditure of local governments in the Yukon Territory and Northwest Territories and on quarterly assets, liability, and the sources and uses of funds of the territorial and local governments.

Review of 1972 Operations

Statistics on estimated revenue and expenditure of the Yukon Territory and Northwest Territories were published for the first time in Provincial Government Finance — Revenue and Expenditures (Estimates). Work continued on a proposed publication on quarterly revenue and expenditure of provincial and territorial governments in the financial management statistical framework. Data were published on employment and payrolls in territorial governments.

Plans for 1973

To publish data quarterly on the revenues and expenditures of provincial and territorial governments, and to plan a quarterly publication providing financial management statistics on the revenues and expenditures of local governments in each province and territory.

HEALTH AND WELFARE DIVISION

Notifiable Diseases

Responsibilities

To collect, each week, reports of new cases of certain epidemic and infectious diseases.

Long-term Plans

No significant changes are planned

Review of 1972 Operations

A weekly summary report and an annual report on notifiable diseases are published.

Plans for 1973

Activities are expected to be the same in 1972.

Tuberculosis

Responsibilities

To publish information on new active reactivated cases, out-patient drug treatment, and institutional data.

Long-term Plans

No significant changes are planned.

Review of 1972 Operations

Statistics on new and reactivated cases and details of out-patient treatment were published. Institutional data for the Northwest Territories — there are no tuberculosis hospitals in the Yukon territory — were collected.

Plans for 1973

Activities are expected to be the same in 1972.

Hospital Morbidity**Responsibilities**

To collect information on the admission-paration forms for general and allied special hospital cases of residents of the Yukon Territory and Northwest Territories.

Long-term Plans

Annual tables will be prepared when historical work is completed.

Review of 1972 Operations

Historical work was reviewed for 1962 to 1968 in terms of three-digit categories of the International Classification of Diseases, adapted. Reports on cancer cases during 1971 were abstracted to add data to the national Cancer Incidence Reporting system.

Plans for 1973

Data for 1969 to 1972 will be collected.

Vital Statistics

Data from the vital statistics offices of the two Territories are used by Statistics Canada in compiling national vital statistics and providing the Territories, with pertinent detailed annual tabulations.

Review of 1972 Operations

Detailed tabulations for 1971 of births, marriages and deaths were provided to the northern administrations.

Plans for 1973

New forms for the registration of births, marriages, deaths and deaths were adopted in the Northwest Territories on 1 January and likely will be used in the Yukon Territory in 1974. The forms are based on models recommended by the Vital Statistics Council for Canada.

Institutions**Hospitals****Responsibilities**

To publish statistics of general and allied special hospitals and mental and tuberculosis hospitals, including those in the Yukon and Northwest Territories.

Long-term Plans

A new reporting form will be developed for mental institutions for inclusion in a single system for general and allied hospitals and tuberculosis sanatoria. Also planned is a

Canadian schedule of unit values for radiology procedures to help hospitals report uniformly.

Review of 1972 Operations

Fifty-two general and allied special hospitals were operating in the Yukon and Northwest Territories at the end of 1972. Six were public hospitals with a total of 221 beds; one, with 13 beds, was private; and 45 with a total of 421 beds were federal. Annual returns were sent to the hospitals through the Yukon Territorial Hospital Insurance Services and the Department of Indian and Northern Affairs. Statistics for 1970 were published in 11 reports. The Quarterly Hospital Information System was changed to include additional information and provide hospitals not only with provincial and regional comparisons but also with national values for the performance indicators. The Canadian Schedule of Unit Values for Clinical Laboratory Procedures was again revised.

Plans for 1973

Included are a continuation of present programs and an emphasis on earlier publication of information.

(b) Health Manpower**Responsibilities**

To collect every two years wage and salary information on persons in health occupations and to gather socio-economic information every year on such persons in the Yukon and Northwest Territories.

Long-term Plans

A statistical series on all health occupations is under study.

Review of 1972 Operations

Characteristics of registered nurses in the Yukon and Northwest Territories were collected.

Plans for 1973

Systems are being developed for surveys of radiological technicians and physiotherapists.

Mental Health Section**Responsibilities**

To publish statistics on residents of the Territories who are patients in provincial psychiatric institutions.

Long-term Plans

There are no psychiatric in-patient facilities in the Territories that submit information to the section but psychiatric units are expected to be established soon.

JUDICIAL DIVISION**Responsibilities**

To publish statistics on law enforcement, and the administration of justice and corrections.

Long-term Plans

The integrated court-reporting system (adult and juvenile) and the prison reporting system should be in operation in the Northwest Territories at the beginning of next year. The prison-reporting system should be in effect in the Yukon Territory at the same time.

Review of 1972 Operations

Various publications of the division contain statistics of the Yukon and Northwest Territories. Included are data on criminal and other offences, juvenile delinquents, police administration, traffic enforcement, correctional institutions, murder, and the National Parole Board.

Plans for 1973

The present programs continue.

LABOUR DIVISION**Unemployment Insurance Statistics****Responsibilities**

To publish statistics on the operation of the Unemployment Insurance Act.

Long-term Plans

To continue the present program.

Review of 1972 Operations

Unemployment claims for the Yukon are handled by an unemployment insurance commission office in British Columbia and claims for the Northwest Territories by offices in Alberta, Manitoba and Quebec. These offices provide information for the two regions.

Plans for 1973

To publish separately in the Statistical Report of the Unemployment Insurance

Act, statistics on claims and benefits for the Yukon and Northwest Territories.

Labour Force Survey

Responsibilities

To estimate the number of persons employed, unemployed or not in the labour force, using a monthly sample survey of households.

Long-term Plans

The feasibility of extending the Labour Force Survey to include the Yukon and Northwest Territories is being studied as part of the current revision of the Labour Force Survey scheduled for completion in 1976.

Review of 1972 Operations

The Labour Force Survey does not collect information in the Yukon and the Northwest Territories.

MANUFACTURING AND PRIMARY INDUSTRIES DIVISION

Responsibilities

To publish statistics on manufacturing, mining, logging, fishing and energy.

Long-term Plans

To expand the current statistical program.

Review of 1972 Operations

Industries surveyed accounted for 99 per cent of goods produced in the Yukon Territory and Northwest Territories, excluding construction. Statistics continued to be published annually for mining, and monthly for pipelines in the Yukon. Statistics on electric power, fishing and logging were published.

Plans for 1973

To continue the present expanded publications program.

MERCHANDISING AND SERVICES DIVISION

Responsibilities

To publish statistics on the economy's retail, wholesale and service sectors, and perform special studies in such areas as consumer credit, inventories, direct selling, voluntary-group store operations, and retail and service activities in shopping centres.

Long-term Plans

To develop surveys in the commercial and non-commercial services fields. One aim is a monthly service trade survey similar to the retail trade survey.

Review of 1972 Operations

Questionnaires for the 1971 Census of Merchandising and Service Businesses were mailed in March and April. The New Retail Trade Survey was further developed and it soon should be in operation. In the previous retail survey, statistics on the Yukon and Northwest Territories were included with British Columbia estimates. In the new survey, information on the Territories will be published separately, if possible. The monthly survey of wholesale trade continued to be published only at the Canada level. Most service trade publications continued to include information about the Territories with the British Columbia totals. The reports on accommodation and on motion picture theatres and exchanges showed the figures separately.

Plans for 1973

Data from the 1971 Census of Merchandising and Service Businesses are expected to be published in the last quarter of the year. Plans for the 1973 Retail Commodity Survey are under way. Work will begin on the first survey of the non-commercial services areas and, if possible, data for the Yukon Territory and the Northwest Territories will be published separately.

PRICES DIVISION

Responsibilities

Isolated-post allowance indexes for federal employees.

Long-term Plans

Participation in an interdepartmental committee to review the federal government isolated-post allowance system.

Review of 1972 Operations

Limited studies of comparative living-costs as a guide for federal government salary policy were continued.

Plans for 1973

A survey is under way covering complete family expenses for 1972 of 750 sample households in Whitehorse and Yellowknife.

TRANSPORTATION AND COMMUNICATIONS DIVISION

Responsibilities

To publish statistics for the Yukon and Northwest Territories covering rail, water, motor vehicle and air transport, as well as communications systems and other utilities.

Long-term Plans

No significant changes are planned.

Review of 1972 Operations

Road Transport

Publications include statistics on road and street mileage and expenditure, traffic accidents, fuel sales, registrations and revenue. The survey introduced in 1971 of inter-city commodity movements by for-hire trucking firms was expanded.

Rail Transport

Statistics of the White Pass and Yukon Railway and the Great Slave Lake are published.

Water Transport

Shipping reports carry complete statistics for Churchill, Manitoba and all Northwest Territories, Northern Ontario and Northern Quebec ports that trade with Eastern Canada. The published statistics do not include the operations of government vessels.

Air Transport

Aircraft movement statistics, collected from daily reports by air-traffic controllers and airport managers, are prepared for the Ministry of Transport. The survey includes six airports in the Yukon and 15 in the Northwest Territories. A special study of aircraft movements at specified airports in the Mackenzie Valley was carried out under contract for Gemini North Ltd. which was doing research for the MOT-Arctic Transportation Agency.

Communications

Statistics cover telephone, telegraph and cable traffic. Some figures for the territories are combined some shown separately and others included with British Columbia.

Plans for 1973

A review aimed at improving surveys in road, rail and water transport continues, and changes in the surveys will be made during the year.

TRANSPORT CANADA (MOT)

ARCTIC TRANSPORTATION AGENCY

The Arctic Transportation Agency determines and controls development of the transportation infrastructure in the Territories which comes under the Ministry of Transport. The Agency aims to provide transportation systems which will help to realize the national objectives for Northern Canada. To do this most effectively, it is necessary to continually assess the alternatives to which the limited transportation resources may be put, and to establish priorities. Formulating the plan for transportation systems in the Territories involves consultation with the Territorial governments, industry and other organizations. Co-ordination with other government departments and agencies is essential and is carried out through the Advisory Committee on Northern Development and the Task Force on Northern Oil Development. The Department of Transport Canada in the activities of these committees is centered in the Arctic Transportation Agency, and its Administrator is chairman of both their transportation sub-committees. An Arctic Transportation Agency office was recently established in Yellowknife, NWT, to become fully acquainted with the transportation needs of northern communities, and to keep in touch with the Territorial governments. The Agency also responds to various requests from government departments for assistance and support concerning the ministry's role in the Arctic. The MOT program for the Territories which is implemented by the appropriate administrations in the ministry, and other agencies, who have the technical and operational responsibilities, involves expenditures of approximately \$30,000,000 a year and revenues of approximately \$7,000,000.

The agency also helps analyze and develop the use of road, rail, pipeline, hovercraft and other facilities so as to ensure appropriate and improved inter-modal transportation services in the North.

The agency is involved in a number of analyses of multimodal transportation in the Territories. An example is the survey of total aircraft movements in the Mackenzie valley aimed at facilitating planning to meet future needs for airports and navigational aids.

In view of recent developments, the agency is accelerating the projects which will satisfy the growing needs resulting from the changing requirements. To this end, the capital funding for the 1973/74 fiscal years is increased by more than 100% over the previous year.

CANADIAN AIR TRANSPORTATION ADMINISTRATION

Through two main directorates, (Airports and Construction, and Civil Aeronautics) provides safe and efficient facilities and services in support of air transportation.

Civil aeronautics

The Civil Aeronautics Directorate of the Canadian Air Transportation Administration, plans, co-ordinates and directs all activities relating to the control and orderly development of civil aeronautics in Canada. These activities include developing and enforcing legislation, standards and regulations through licensing and inspection; providing electronic and telecommunication services and systems in support of civil aeronautics and other administrations and departments; designating airspace and the operational

control of aircraft, investigating aircraft accidents and doing research into the development of improved aviation systems; improving security; and providing government flight services.

Airports and construction

The Airports and Construction Directorate of the Canadian Air Transportation Administration plans and co-ordinates all activities relating to airport operations, services and facilities. These activities include: the development of policies and guidelines regarding marketing, security and operation of airports; development of policies and standards for the planning, design, construction and maintenance of airport facilities; provision of financial and advisory assistance to community airports; provision of engineering and architectural support in respect of off-airport CATA installations, to other elements of the Ministry, to CIDA and other federal organizations. The directorate is also responsible for all major construction and for providing design packages for projects undertaken by regional administrators.

CIVIL AERONAUTICS

Review of 1972 Operations

Omega

A program of monitoring and recording propagation characteristics of Omega Navigation System signals is being conducted in northern and Arctic regions. Monitors are being operated at five sites. They are: Grande Prairie, Alberta; in the Northwest Territories: Resolute, Coral Harbour, Frobisher Bay and Inuvik. Data obtained is used to improve correction tables and to determine the predictability of sporadic ionospheric disturbances, polar cap anomalies

and other phenomena peculiar to northern and Arctic regions.

Ionospheric propagation monitoring

A station was activated at Churchill during July 1971 to measure the ionospheric scintillation at VHF and UHF using the satellites LES-6 and ATS-5 respectively. These tests were conducted in co-operation with the Communications Research Centre, FAA and NASA. The ionospheric tests were concluded in November 1972, and a paper has been presented to IMCO Panel of Experts on Maritime Satellites.

The purpose of these tests is to determine margins required on the Aeronautical and Maritime Satellite Systems.

Tests are continuing to determine the effects of the ionosphere on the accuracy of a satellite position determining system.

Dewline radio system

Arrangements were made with the USAF to provide circuits for local telephone exchanges and to improve long-distance service to the Arctic communities of Pelly, Spence Bay and Gjoa Haven.

Arctic facsimile

The weatherfax network was extended to Inuvik and broadband facilities were provided to enable the transmission of ice charts from that location to the Ottawa Ice Central Office. Telephone service was provided at Frobisher Bay for the same purpose.

ANIK telecommunications satellite

During the year the ministry completed a review of the possible application of improved communications provided by the ANIK telecommunications satellite and earth station network. The high cost of facilities and the disparity between settlements served by the satellite system and those where MOT has an operational presence, have ruled out any immediate use. A continuing review of the ability of the ANIK system to meet the needs of the ministry will result in some use as the network of earth stations expands.

Aeronautical communications

Compatible amplitude modulated, single sideband (AM/SSB) equipment, to accommodate aircraft equipped with either mode was commissioned at the following aeradio stations in the Northwest Territories:

Cambridge Bay,
Coppermine,
Fort Good Hope,

Hay River,
Inuvik,
Norman Wells,
Wrigley and
Yellowknife.

Inuvik, NWT

An Air Traffic Control (ATC) peripheral VHF station controlled from Edmonton Area Control Centre (ACC) was commissioned.

Resolute Bay, NWT

In early 1972 new transmitter installations were made to provide back up for the International Civil Aviation Organization (ICAO) service in the North.

Sachs Harbour, NWT

A scheduled weather broadcast service was implemented over the non-directional radiobeacon on a 24-hour basis.

Navigation aid facilities

Non-directional radiobecons (NDB) were commissioned for Holman Island, Fort Reliance, Port Radium and Resolute, NWT.

At Resolute an instrument landing system (ILS) was commissioned and a tactical air navigation system (TACAN) was taken over from the Department of National Defence (DND).

Due to the nature of the terrain in Frobisher, NWT., VOR tests have not been satisfactory. The station will be transformed to a Doppler VOR System. A DME facility will be placed with the ILS in 1973.

Arctic package for VHF omnidirectional radio range and distance measuring equipment (VOR/DME)

A prototype VHF omni-range with distance measuring equipment, (VOR/DME) Arctic package including equipment, building and emergency power was installed at Carp, Ontario for testing.

A similar prototype complete with building and emergency power is being installed at Cambridge Bay, NWT, for testing in 1973.

Future plans

Long-term plans include the extension of VOR/DME facilities, ILS, runway and approach lighting, and visual approach slope indicator systems (VASIS). Long-term plans also include procuring aircraft for flight checking in the Arctic, and the development of appropriate flight checking procedures.

VOR/DME stations are planned for 1973, at Fort Simpson, Inuvik, Norman Wells, Whitehorse, Yellowknife and Watson Lake (Doppler VOR/DME). The prototype now

under test at Carp, Ontario will be relocated to Resolute, NWT, in 1973. In 1974 it is planned to install ten more Arctic package VOR/DMEs at various Arctic stations.

A glide path will be commissioned in 1973 on the existing localizer to complete the ILS installation at Hay River, NWT.

A non-directional radiobeacon is planned for 1973 in Old Crow, Yukon Territory.

A VHF/DF installation is planned in 1973 in Whitehorse, NWT.

Aeronautical communications

The conversion of the HF air-ground equipment of 5680 KHz to a compatible AM/SSB mode of operation will continue during 1973 at northern aeradio stations equipped with this facility, such as Tuktoyaktuk, NWT.

A VHF/ATC peripheral station controlled from Edmonton ACC will be commissioned in 1973 for Hay River, Norman Wells and Yellowknife, NWT.

For 1973/74 it is intended to establish aeradio station at Tuktoyaktuk, NWT. The equipment will be prefabricated in a trailer for shipment by barge.

In 1973 it is planned to continue the Omega monitoring program until the Omega Norway is on the air at full power. The automatic Omega receiver purchased from Canadian Marconi Company will be tested in various parts of Canada including possible tests on air cushion vehicles (ACV) in the Mackenzie River delta.

Air traffic services

Review of 1972 Operations

Air traffic control continued to provide area control service for flights operating under instrument flight rules in the Arctic Control Area of Canada. This area extended basically from the 72° North parallel of latitude to the geographical North Pole and at above flight level 290. The service provides protection and separation for commercial carriers operating between Europe and the Orient that stage through Alaska; also a service to domestic flights operating north/south into and out of the Arctic islands. In support of this service, ATC operates a discrete telephone circuit from the Edmonton ACC to Cambridge Bay, NWT, with switching arrangements at this point into the Sondrestrom ACC in Greenland and with the Anchorage air route traffic control centre in Alaska.

In the Northern Control Area of Canada area control service was provided for all

ights operating above flight level 230. Flights which benefited from this service and are provided with separation were commercial and military operators, operating between Europe and western North America and between the Eastern Seaboard and Alaska.

Flight information service and alerting service for search and rescue purposes were provided to all known flights in northern Canada and the Arctic region as was practiced since the total area was designated as a flight information region up to the geographical North Pole.

Due to the increase in traffic along the Mackenzie River, along with the growth potential, a number of controlled airways were designated from Yellowknife to Inuvik. Also, control zones and control area extensions were designated at Fort Simpson, Norman Wells and Inuvik.

To meet an urgent need for improved service at Inuvik, a VHF peripheral station for direct controller-to-pilot communication was commissioned for operation from the Inuvik control centre.

An airport control tower remained in operation at Whitehorse, YT airport. In June 1972 a control tower was commissioned at Yellowknife, NWT.

Future plans

On installation of additional VOR/DME facilities and the establishment of additional airways and control area extensions, ATC services will be enlarged. The increased air traffic in the North due to current resource development will probably require additional airport control service at various locations.

Plans for 1973

Action has been taken to procure two transportable airport control towers for use in Northern Canada, in order that ATC can meet sudden unexpected demands for airport control service at various locations. It is expected that the new airport control tower at Inuvik will be commissioned in March 1973. ATC staff have been on site since December 1972 assisting the aeradio operators for familiarization training.

Proposed regulatory changes

Emergency locator transmitters (ELTs)

An inter-departmental task force composed of representatives from the Ministry of Transport, Industry, Trade and Commerce, Finance, National Defence, Science and Technology, Consumer and Corporate

Affairs, Communications, National Research Council, and Treasury Board has been studying this matter for some time. In addition, a draft proposed air navigation order concerning the carriage of emergency locator transmitters was circulated to industry for comment late in 1972. The intensive review of the subject by the task force includes consideration of all comments from industry on the proposed order. The final report and recommendations of the task force were expected to be available in April 1973.

Standards and procedures for air carriers using small planes in air transport operations

Properly defined standards based upon sound operational practices are essential in the interest of public safety and operational efficiency. To meet this requirement with respect to the operation of small aircraft by air carriers, a new air navigation order was developed and circulated to industry for comment during 1972. This new order has now been finalized and will come into effect 1 January 1974.

Airports and construction services

Review of 1972 Operations

Coppermine, NWT

Completed construction of joint DIAND/MOT project for a 3,000-foot landing strip and access road.

Eskimo Point, NWT

Completed an engineering site investigation for a landing strip and access road.

Eureka, NWT

Provided two-150 KW diesel-electric sets as prime movers.

Frobisher Bay, NWT

The public space in the air terminal building was increased, and VASIS installed.

Inuvik, NWT

The air terminal building was enlarged to accommodate an increase in passenger traffic. The aircraft apron was extended and construction on the control tower is progressing on schedule.

Old Crow, YT

Provided advisory engineering service in the completion of a 5,000-foot landing strip constructed by the Yukon Territorial government.

Pangnirtung, NWT

Provided advisory engineering service in the completion of a 2,800-foot landing strip constructed by DND.

Resolute Bay, NWT

Improvements started on the sewage disposal system, completion in 1973/74.

Provided two 850 KW and one 350 KW diesel-electric sets as prime movers and one 35 KW diesel-electric set for Canadian Armed Forces TACAN site.

Whale Cove, NWT

Provided advisory engineering service in connection with the construction of a 3,000-foot landing strip by DND.

Yellowknife, NWT

An addition to the air terminal building was completed to increase the public area and the construction of a new control tower also completed.

Plans for 1973

Aklavik, NWT

Conduct site investigations and surveys for landing strip and access road.

Baker Lake, NWT

Improvements to provide 5,000-feet of runway with medium intensity lighting.

Cape Dorset, NWT

Provide advisory engineering service in connection with the construction of a 4,000-foot landing strip.

Eskimo Point, NWT

Complete a landing strip design and provide construction inspection services.

Fort McPherson, NWT

Begin construction of a 3,000-foot landing strip.

Fort Simpson, NWT

Begin paving of the runway, taxiway and aircraft apron which will be completed in 1975/76 at a total cost of \$1,332,000.

Igloolik, NWT

Conduct site investigations and surveys for landing strip and access road.

Inuvik, NWT

Development of commercial area along with a new taxiway.

Pond Inlet, NWT

Complete a landing strip design and provide construction inspection services.

Resolute Bay, NWT

Begin extension of runway 11-29 with completion 1974/75.

Sachs Harbour, NWT

Runway lighting to be installed.

CANADIAN MARINE TRANSPORTATION ADMINISTRATION

Responsibilities

To carry out and co-ordinate the delivery of cargo and passengers for the Canadian government, USAF and commercial concerns; to provide ice and routing information and icebreaker support; to carry out environmental research and surveys as requested by other agencies; to install, operate and maintain marine aids to navigation; to assist with search and rescue operations; to administer the Navigable Waters Protection Act.

Long-term Plans

In response to the growing marine activity in the North, the Canadian Coast Guard plans to expand its icebreaking capability to provide additional support to commercial shipping. Plans call for the upgrading of existing units and construction of four more heavy icebreakers. This increased capability will provide more vessels for the expanded hydrographic services program in the Arctic.

Studies leading to the design of a polar icebreaker are now under way. This will reduce the time required to put the ship in service if it is decided to begin construction.

The ministry will further reduce its involvement in the sealift operation. Within a few years all cargo will be transported by commercial operators. Coast Guard participation will be limited to providing ice information, icebreaker support and administrative assistance. The use of heavy helicopters and hovercraft will be encouraged for Arctic operations.

Commensurate with Arctic development is the growing demand for additional and more modern marine aids to navigation. The emphasis in this field will be in marking the approaches to harbours established at new industrial developments. New aids to navigation will be established each year according to need.

Review of 1972 Operations

The ministry provided five heavy- and two medium-displacement icebreakers for work in Eastern Arctic waters, as well as two northern supply vessels and the CCGS *Narwhal*. The *Narwhal* was formerly employed as a mobile stevedore depot, but, because of changes in stevedore arrangements during the 1972 sealift, the ship was able to be employed on a hydrographic program in James Bay during the past summer.

The ministry's Arctic icebreaking fleet spent all of the 1972 season providing icebreaker support for the sealift. Other normal Arctic icebreaking operations had to be drastically curtailed because of traffic growth and severity of ice conditions.

The most difficult operation was the escort of a seven ship convoy into Eureka Sound by CCGS *Louis S. St-Laurent*, *D'Iberville* and *J.E. Bernier*. The convoy provided the bulk of logistic support for the intensive oil exploration program on Ellesmere Island and Axel Heiberg Island.

Towards the end of the season the damaged tanker *Northern Shell* required icebreaker assistance to get out of Deception Bay and, subsequently, escort assistance to a southern port.

In all, icebreakers escorted over 50 ship movements. One hundred and eighty-two ship movements reported in at the Ice Operation's Office in Frobisher Bay.

All cargo during the 1972 sealift, with the exception of one chartered tanker, was delivered on a rate per ton basis by the shipper. In addition, these vessels carried other cargo which meant that more than 25 vessels were involved in the operation. Fifty-one different settlements and bases, ranging from the Labrador Coast to Eureka, were serviced with over 61,000 tons of cargo. The rate per ton system will be continued for the 1973 sealift in order to generate sufficient data for purposes of comparison.

A total of 2,670 navigational aids were serviced and maintained in the Eastern and Western Arctic during 1972. These include lighted and unlighted buoys, lighted and unlighted shore aids, racons, radiobeacons and radar beacons. More than 90 new aids to navigation were established which are included in the above total.

Plans for 1973

Design of a dual draft vessel to serve the coastal section of the Mackenzie delta in the Western Arctic will commence in 1973. This vessel will reduce the work load and allow for continued improvement of the aids system.

The Bell Voyager ACV will be evaluated in commercial and coast guard roles on the Mackenzie River and in the Western Arctic in 1973. It will also carry out environmental trials.

Plans are finalized for the construction of nine structures to mark the approaches and the entrance to Fort George in James Bay.

Plans are now being formulated for the construction of radar reflector support

towers to mark the low lands and isolated islands on the East and West coasts of Hudson Bay.

CANADIAN SURFACE TRANSPORTATION ADMINISTRATION

During 1972 the surface administration and other ministry components completed a forecast of transportation needs over the next decade in the Canadian northwest. Titled "Northwest Transportation Plan — 1972", this study focusses on the various roles and requirements foreseen for transportation systems in the region through the 80s. The report was made available to the public at year end, with the purpose of assisting the detailed planning of transportation in the region being carried out by various government, corporate and other interests. Implementation and further planning of several of the programs covered in the study are expected to proceed in 1973.

TRANSPORTATION DEVELOPMENT AGENCY

Responsibilities

To provide leadership and direction to sectors of transportation in Canada in the performance of research and development and to identify technological and operational improvements to existing and future Canadian transportation systems.

Review of 1972 Operations

Arctic resource transport

TDA chairs a steering group and will manage contracted studies to determine the relative economics and effectiveness of alternative systems for transporting oil and gas from the Canadian Arctic islands to potential markets; this is being done in co-operation with Arctic Transportation Agency.

Air-cushion towed raft

TDA is acting as program manager for contracted studies to evaluate the suitability of towed ACVs for off-road transportation; this is being done in co-operation with CMTA.

Arctic Railway

During 1972 TDA, in co-operation with other ministry components, contributed to the funding of an independent study by the

Canadian Institute of Guided Ground Transport for the feasibility of the southward movement by rail of oil from north coast areas. The study explored the economic and physical factors of this concept as an alternative to pipeline transportation, and has been released for further consideration to parties involved and interested in the planning of oil movements from the Canadian North.

Voyageur ACV evaluation

TDA is acting as program manager for the rational evaluation of the Canadian-built Voyageur ACV; this is being done in cooperation with CMTA and NTCL, and includes extensive service in the Mackenzie River area.

Economic working group on the Mackenzie highway

TDA chairs a sub-group which is assessing logistic savings to pipeline companies as a result of highway and waterway improvements in the Northwest Territories and Yukon.

Arctic icebreaking cargo vessel design study

CMTA is co-operating with TDA and NTCL in a program to determine the most effective way to use Canadian expertise in design, manufacture and operation of icebreaking cargo vessels for the Arctic.

Ice thickness measurement

TDA is co-operating with CATA, CMTA and DOE in conducting research into the use of remote sensing UHF radio meter for the determination of ice thickness.

Airship operations and technology

A preliminary study is under way to identify potential uses for large cargo airships, to assess the operational and economic viability of such airships designed, manufactured and operated, using current technology.

UNEMPLOYMENT INSURANCE COMMISSION (UIC)

Responsibilities

To administer the Unemployment Insurance Act, and to provide benefits to workers in the area under the provisions of the Unemployment Insurance Act. The district office in Prince George, B.C., and an enquiry centre in Whitehorse, serve the Yukon Territory; the district office in Edmonton, Alberta serves the districts of Mackenzie and Franklin, except Baffin Island in the Northwest Territories. The district offices in Winnipeg, Manitoba and Montreal, Quebec, serve the districts of Keewatin and Baffin Island respectively.

Long-term Plans

To increase contact with Territorial government and settlement agents in order to raise the standard of service in the area.

Review of 1972 Operations

The Canadian public usually deals with the commission by mail. The commission operates district offices only in larger centres, but employees travel throughout the area to conduct interviews to ensure adherence to the Act.

Unemployment insurance services were provided in the Yukon Territory and the Northwest Territories through the offices noted above. There were also agents to assist people in completing their Application for Benefits forms in Hay River, Inuvik and Yellowknife. In this first full year under new legislation, the commission extended its enquiry service, through Canada Manpower Centres; a full-time Unemployment Insurance Commission employee was appointed and attached to the staff of the Canada Manpower Centre in Yellowknife. In Inuvik and Hay River, a Canada Manpower Centre employee was trained by the Unemployment

Insurance Commission to handle enquiries on a part-time or on an as-required basis. During the winter this service was provided fulltime in Hay River.

Services on Baffin Island were also extended by the establishment of a full-time enquiry office in Frobisher Bay. Discussions are being held with the Department of Manpower and Immigration to consider extending unemployment insurance services through offices at Poste de la Baleine and Fort Chimo. In the meantime, dealings with residents of these areas have been through "la direction générale du nouveau Québec, ministère des richesses naturelles".

Plans for 1973

The reorganization of the Unemployment Insurance Commission will affect both Unemployment Insurance Commission offices in Whitehorse and Frobisher Bay. In Frobisher Bay all services will be provided, although decisions will continue to be made in Montreal. The office in Whitehorse will begin to offer all services. It will maintain its own claim files, but administratively will still report to the district office in Prince George.

APPENDIX A

**Population — Settlements in
Northwest Territories**

Source: Statistics Canada

Preliminary counts of the 1971 Census with
corresponding 1966 population figures.

Settlement	1966	1971			
Yellowknife *	3,741	5,867	Paulatuk	40	95
Inuvik	2,040	2,672	Reindeer Station	76	—
Hay River	2,002	2,420	Rae Lake	53	73
Fort Smith	2,120	2,372	Nahanni Butte	71	66
Frobisher Bay	1,631	2,014	Colville Lake	67	65
Pine Point	459	1,225	Daly Bay	59	—
Rae	779	1,056	Enterprise	25	56
Baker Lake	596	756	Trout Lake	30	48
Fort Simpson	712	747	Jean Marie River	51	47
Cambridge Bay	511	716	Kakisa Lake	39	42
Pangnirtung	376	690	Kipisa	38	33
Fort McPherson	654	679	Marian Lake Village	43	29
Aklavik	611	677	Camsell	—	25
Coppermine	536	637	Edzo	—	25
Fort Resolution	677	623	Dory Point	—	17
Eskimo Point	464	598	Marian Lake Camp	—	16
Cape Dorset	357	597	Camp Kyukjuak	—	15
Tuktoyaktuk	512	596	Pattinson Harbour	13	—
Fort Providence	378	566	Cape Parry	50	12
Rankin Inlet	429	566	Eureka	13	10
Igloodik	328	563	Paradise Gardens	—	10
Pond Inlet	178	416	Snare Lake	56	9
Coral Harbour	298	355	Aslon Bay	—	8
Fort Franklin	311	339	Resolution Island	18	8
Broughton Island	201	334	Mould Bay	56	6
Fort Good Hope	335	327	Hislop Lake	25	4
Norman Wells	199	301	Rocher River	38	4
Gjoa Haven	162	276	Twin Gorges	—	5
Clyde River	99	274	Buffalo River Junction	—	3
Arctic Bay	123	269	Nicholson Point	22	3
Hall Beach	100	263	Salt River	7	2
Fort Liard	177	263	Isachsen	12	2
Chesterfield Inlet	199	258	Bell Rock	—	1
Fort Norman	216	248	Other	2,815	530
Repulse Bay	146	242			
Holman Island	179	241			
Belcher Islands	178	234			
Snowdrift	176	221			
Pelly Bay	171	215			
Whale Cove	181	213			
Spence Bay	247	209			
Lake Harbour	97	189			
Resolute Bay	254	184			
Lac La Martre	125	161			
Wrigley	136	152			
Sachs Harbour	132	143			
Tungsten	198	130			
Grise Fiord	198	109			
Arctic Red River	86	108			
Port Burwell	105	107			
Port Radium	1	99			
			<u>Total</u>	<u>28,738</u>	<u>34,807</u>

Population — Settlements in
Yukon Territory

Source: Statistics Canada

Preliminary counts of the 1971 Census
with corresponding 1966 population figures.

Settlement	1966	1971
Whitehorse*	4,771	11,084
Faro	—	850
Dawson	742	745
Watson Lake	554	553
Mayo	479	462
Clinton Creek	—	381
Carmacks	311	348
Teslin	324	340
Ross River	173	317
Elsa	529	298
Upper Liard	148	219
Old Crow	218	206
Carcross	199	188
Haines Junction	195	179
Pelly Crossing	137	141
Beaver Creek	114	120
Watson Lake Airport	77	89
Destruction Bay	64	82
Keno Hill	144	79
Flat Creek	1	71
Burwash Landing	69	67
Stewart Crossing	28	43
Quill Creek	2	35
Swift River	40	33
Mile 904, Alaska Hwy	—	29
Mile 837, Alaska Hwy	—	24
Mile 5, Klondike Hwy	—	21
Mile 1035, Alaska Hwy	—	20
Iron Creek	28	19
Tuchitua Lake	—	17
Mile 850, Alaska Hwy	—	17
Vindid Lake	—	16
Millerville	18	16
Mile 1169, Alaska Hwy	8	15
Mile 687, Alaska Hwy	6	14
Mile 866, Alaska Hwy	6	14
Mile 2, Klondike Hwy	—	13
Mile 974, Alaska Hwy	—	13
Dominion Creek	5	12
Agile River	—	12
McCabe Creek	—	12
Mile 3, Klondike Hwy	—	12
Mile 1019, Alaska Hwy	21	12
Jonjek	13	11
Howley	11	11
Other	4,870	1,128
	<u>14,382</u>	<u>18,388</u>

APPENDIX B

GOVERNMENT EXPENDITURES ON THE NORTH

During 1972-73, the federal and the two territorial governments budgeted \$306.2 million for the North. The following tables classify the expenditures by spending agency, economic function and national northern objective.

Table 1 sets out expenditures by agency and economic function. Each economic function distinguishes, in general terms, the immediate purpose of the expenditure. For example, outlays on northern housing for native peoples, family allowances and social assistance of various kinds are aspects of welfare and are covered under that category. The expenditure assigned against each agency represents the value of the funds that the agency administered in undertaking specific programs and activities.

Each departmental program and activity has also been classified under one of the seven national northern objectives approved by the government in 1971. These northern objectives describe in more general terms the ultimate purpose of the expenditure. For example, an expenditure on northern housing, which is covered under the economic function "welfare", is a long-term means of improving the "quality of life" in the North. Expenditures under other economic functions, for example "research", also promote this northern objective.

Table 2 itemizes the functional expenditures of Table 1 and how these figures are located against ultimate objectives. In this way, the main thrust of northern expenditures is illustrated. The column headings describe in general terms seven northern objectives (the "residual" column covers those expenditures that cannot be assigned specifically against any one of the seven objectives).

Of the \$306.2 million budgeted for 1972/73, \$142.1 million, or about 47 per

cent, was spent on programs and activities administered by the two Territorial governments. However, these two governments raised only \$18.5 million of this sum through taxation on northern residents or from the receipts from provision of services. Therefore, the remaining \$123.6 million spent on programs administered by them was derived from transfer payments from the federal government. Figures 1 and 2 distinguish between the source of funds and the agencies responsible for their utilization.

Table 1 indicates that federal government agencies spent \$164.1 million on their own account. Eighteen federal government agencies were identified as having northern programs in 1972/73. Of these, seven provided goods and services from which they received some revenue from non-government users of these services. The expenditures and revenues of these agencies are listed below.

Expenditure on own account	Revenue	Net expenditure
\$000's		
Indian Affairs	56,497	17,945
Transport	28,108	5,207
Health & Welfare	17,207	3,400
Public Works	8,870	2,042
Energy, Mines & Resources	8,271	35
Post Office	3,948	758
Justice	289	200
	123,190	29,588
		93,604

In previous year this publication has attempted to show expenditures actually made in the North. Considerable expenditure of direct benefit to the North takes place in southern Canada however, and this expenditure has been included in the 1972-73 figures. Of the \$306.2 million, about \$200 million is spent in the North and the remaining \$106 million in the rest of Canada.

Sources of Funds

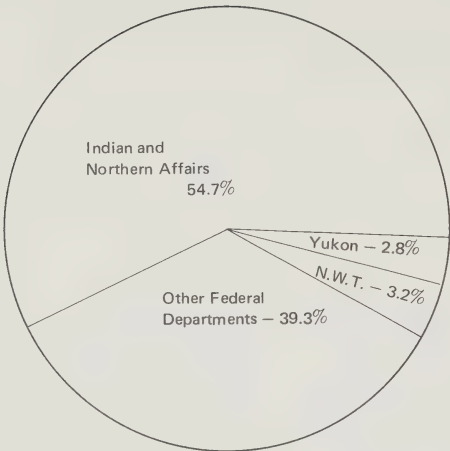


Figure 1

Spending Agency

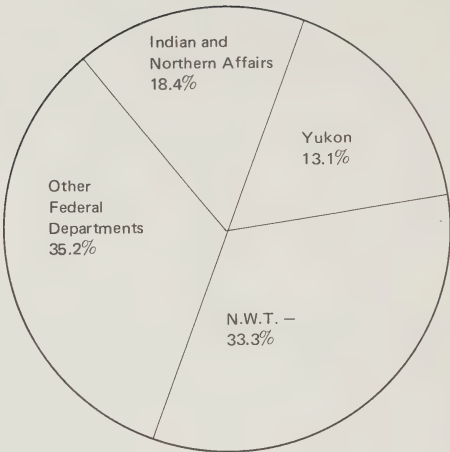


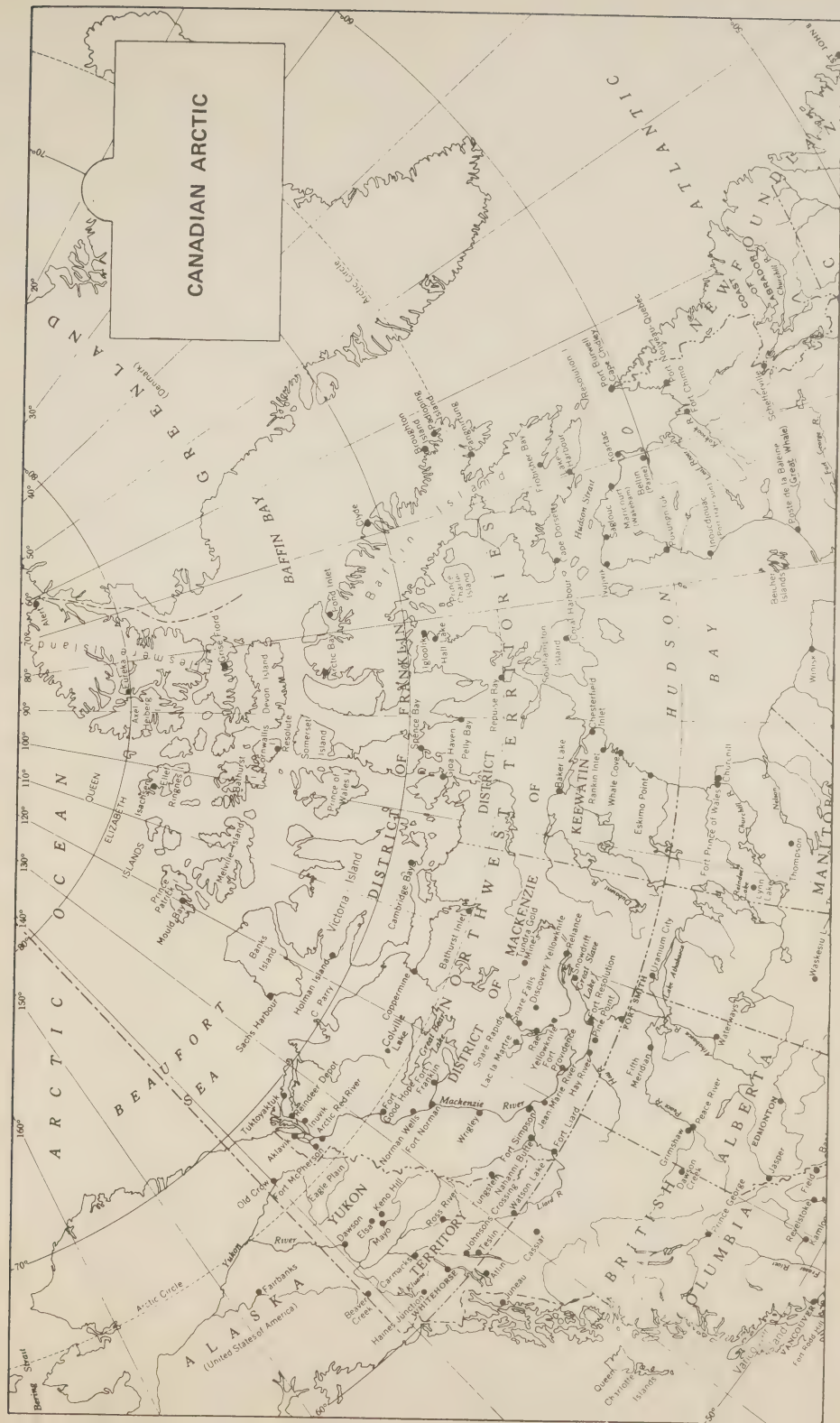
Figure 2

All figures in \$000's

Function Agency		Education	Health	Welfare	Transport/ Communication	Economic Development and Support (Human)	Economic Development and Support (Other)	Defence	Local Government	Research	Culture and Recreation	General Gov't Services	Total Direct Expenditure	Percentage Distribution
Indian and Northern Affairs Gov't of N.W.T. Gov't of Yukon National Health and Welfare Manpower and Immigration Public Works R.C.M.P. Transport Environment Energy, Mines and Resources National Research Council National Defence Post Office Communications C.B.C. Other Dept's		29,402	6,175	5,866	19,959	2,441	6,766			2,265	713	18,487	56,497	18.4
		10,938	3,903	12,237	2,103		6,146		12,098			33,894	102,055	33.3
				3,221	11,982		1,013		3,890			5,071	40,018	13.2
			13,522	3,685									17,207	5.6
						1,982							1,982	0.7
					3,350							5,520	8,870	2.9
												5,044	5,044	1.7
					28,108								28,108	9.2
					2,053					2,893		5,279	10,225	3.3
										7,243		1,028	8,271	2.7
Total Direct Expenditure								5,300		7,759			7,759	2.5
										5,249			10,549	3.4
													3,948	1.3
										559			3,217	1.0
Percentage Distribution										51		745	1,701	0.5
													796	0.3
Total Direct Expenditure		40,340	23,600	25,009	75,862	4,423	13,925	5,300	15,988	26,019	713	75,068	306,247	100.0
Percentage Distribution		13.2	7.8	8.2	24.8	1.4	4.5	1.7	5.2	8.5	0.2	24.5	100.0	

TABLE 2 All figures in \$000's

Function	Evolution of Gov't	Quality of life	Contribution to Cdn. Social Development	Economic Growth	Sovereignty	Protection of Environment	Recreation	Residual	Total Direct Expenditure	Percentage Distribution
Education		35,094		5,246					40,340	13.2
Health		23,600							23,600	7.8
Welfare		25,009							25,009	8.2
Transport/Communication		6,606	1,701	64,955	2,600				75,862	24.8
Economic Development and Support (Human)				4,423					4,423	1.4
Economic Development and Support (Other)				12,552		1,373			13,925	4.5
Defence					5,300				5,300	1.7
Local Government	15,988								15,988	5.2
Research		1,595		12,513	5,249	6,662			26,019	8.5
Culture and Recreation							713		713	0.2
General Gov't Services	770	6,576		8,962	18	13,918		44,824	75,068	24.5
Total Direct Expenditure	16,758	98,480	1,701	108,651	13,167	21,953	713	44,824	306,247	100.0
Percentage Distribution	5.5	32.2	0.6	35.4	4.3	7.2	0.2	14.6	100.0	



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